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Rural household's poverty and vulnerability in Amhara region: case study in Gubalafto Woreda

By:

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DECLARATION

This is to declare that this thesis work entitled **"rural household's poverty and vulnerability in Amhara region: case study in Gubalafto Woreda",** submitted in Partial Fulfillment of the Requirements for the award of the degree of MSc. in Economics (Development Policy Analysis) to the College of Business and Economics, Mekelle University, through the Department of Economics is my authentic work carried out by me. All sources of materials used for this thesis have been duly acknowledged.

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CERTIFICATION

This is to certify that this thesis "**Rural household's poverty and vulnerability in Amhara region: case study in Gubalafto Woreda",** submitted in Partial Fulfillment of the Requirements for the award of the degree of MSc. in Economics (Development Policy Analysis) to the College of Business and Economics, Mekelle University, through the Department of Economics, done by **Tesfaye Gedefaw Wolde** (ID No CBE/PR 107/04) is an authentic work carried out under my guidance. To the best of our knowledge, the matter embodied in this thesis work has not been submitted earlier for award of any degree or diploma.

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Abstract

Poverty becomes an everlasting phenomenon in the world particularly in the sub-Sahara Africa in which Ethiopia is one of the most drought prone country. Notably, household's in the rural areas highly vulnerable to poverty because of the frequently occurring environmental and health related shocks. Even if, much effort made regarding poverty reduction and achievement of sustainable development during the past poverty remains pervasive and households highly vulnerable to the emergence relief food aid in the Gubalafto woreda. The paper aims to analyze the extent of poverty and vulnerability to poverty as well as the correlates of poverty, its intensity and vulnerability to poverty. Thus, the primary data was used from the stratified random sample of 250 households drawn from three agroecological zones of Gubalafto woreda, Amhara region. In line with the cost of basic need (CBN) approach, total poverty line of the study area is Birr 294.6 per month per adult equivalent. Foster, Greer and Thorbecke (FGT) group of poverty measures, 3FGLS and the Gini coefficient were utilized to estimate the extents of poverty incidence, mean vulnerability to poverty and consumption inequality index, which accounts 30.08%, 37.42% and 26.83 % respectively. This study applied multivariate regression analysis to identify the correlates of household welfare and the level of vulnerability to poverty, and also the censored regression model (Tobit) used to analyze the determinants of poverty intensity, such as poverty gap and poverty severity. Accordingly, family size, employment on wage, distance to the main market and agroecological dummy affect welfare negatively and significantly but it affects the poverty gap and poverty severity positively. On the other hand, oxen, land size, asset value, employment on own business, access to credit and access to extension service affects the welfare status positively and significantly, but it affects the poverty gap and severity negatively. Moreover, head age, mean age of household, oxen and asset holding, own business activity, access to credit and extension services and village level infrastructural facility affect household vulnerability negatively in the significant manner, while head male, number of children, dependency ration, distance to the main market and kolla agroecological dummy affect positively. In general, the household characteristics, asset holding, off-farm income participation, access to public services such as access to credit and agricultural extension services, village level infrastructural facilities, access to market and agroecological variation were considered as the main determinants of household's welfare, intensity of poverty and vulnerability to poverty in the study area.

Key words: welfare, poverty gap and square poverty gap, vulnerability to poverty, determinants, rural household

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Acronyms and Abbreviations

ACSI	Amhara Credit And Saving Institution
ARNS	Amhara National Regional State
CBN	Cost Of Basic Needs
CSA	Central Statistical Authority
DASP	Distributive Analysis Stata Package
DCI	Direct Calorie Intake
ETB	Ethiopian Birr
FEI	Food Energy Intake
FGLS	Three-Stage Feasible Generalized List Square
FGT	Foster, Greer And Thorbecke
GHS	General Household Survey
HICES	Household Income, Consumption And Expenditure Survey
IFAD	International Fund For Agricultural Development
Kcal	Kilo Calorie
M.D.GS	Millennium Development Goals
MoARD	Ministry Of Agriculture And Rural Development
MoFED	Ministry Of Finance And Economic Development
MT	Metric Ton
NCS	National Consumer Survey
OLS	Ordinary Least Square
PAs	Peasant Associations
PSNP	Productive Safety Net Productive
SSA	Sub-Saharan Africa
TLU	Tropical Livestock Unit
UNDP	United Nations Development Program
US$	United States Dollar
USAID	United States Agency For International Development
VEP	Vulnerability As Expected Poverty
VER	Vulnrarability As Exposure To Risk
VEU	Vulnrarability As Lower Expected Utility
VIF	Variance Inflation Factors
WHO	World Health Organization

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CHAPTER ONE

1.1 Introduction

Poverty is one of the most serious manifestations of human deprivation and inextricably linked to human capital development; it is thus an issue of global concern. Poverty encompasses inadequate income and denial of the necessities such as education, health services, fresh water and hygiene (World Bank, 2007) which are essential for human survival and dignity. It is the most chronic problem for the developing world in general and for Sub-Sahara Africa in particular and hence, it has been the primary development challenge for developing countries.

Most countries of the world fall under the absolute poverty line. Hence, the problem of poverty as well as how to alleviate poverty remains the most pressing dilemma in the international development debate even if the poverty reduction has become central goal of development planners. As a result, poverty reduction became a subject that has attracted serious international debate for more than 20 years. Hence, the United Nation general assembly in 2000 summarized the development goals agreed upon at various international conferences and World summits particularly during the 1990's. And tagged it the "Millennium Development Goals" (M.D.Gs.) and targeting with dipping an extreme poverty and hunger by half for the year 2015 relative to the 1990 absolute poverty levels, as the first among the eight targeted goals (Vincent, 2006). Hence, particularly most of the developing countries committed to achieve targeted objectives and significantly, their poverty alleviation funds rose year after year.

Despite massive progress in reducing poverty and vulnerability in some parts of the world over the past pair of decades, particularly in East Asia, there are still about 1.4 billion people existing on less than US$1.25 day, and close to 1 billion people suffering from hunger. Around 70 percent of the world's very poor people are living in the rural area and a large percentage of the poor and hungry are children and young people (IFAD, 2011). Rural poverty has declined more slowly in South Asia, where the incidence of poverty is still more than 45 per cent in extreme poverty and over 80 per cent for US$2/day poverty line. Similarly, in sub-Saharan Africa, where above 60 per cent of the rural population lives on less than US$1.25 a day, and almost 90 percent lives on less than US$2/day. South Asia, which is known for having the largest number of rural

poor people and Sub-Sahara Africa, which accounts the highest incidence of rural poverty, are the two most affected regions in the world. It indicates that poverty is highly deep rooted, and cannot be controlled its root causes still now. Therefore, for now and for the predictable future, it is thus critical to direct greater attention and resources to creating new economic opportunities in the rural areas for the coming generations.

Like poverty, Vulnerability is a multi-dimensional phenomenon, because it can be related to very different kinds of risks (Makoka & Kaplan, 2005). However, most studies deal with the vulnerability to natural disasters, climate change or poverty. Households in developing countries are frequently hit by severe idiosyncratic shocks (i.e. household-level shocks, such as death, injury or unemployment) and covariate shocks (i.e. community shocks, such as natural disasters or epidemics), resulting in high-income volatility (Günther and Harttgen, 2006). Some non-poor households are vulnerable to weather disturbances and economic shocks, bad harvest, a lost job or an illness by the major income earner in a household that easily push them in to poverty (Tabunda & Albert, 2002).

Most policy interventions adopted by sub-Saharan African countries have however only focused on poverty at a point in time. Nevertheless, poverty as a vulnerability concept is now considered as a dynamic progression, which allows for putting in place appropriate proactive interventions to address poverty. Poor people are more vulnerable to any shock (health hazards, economic downturns, natural catastrophes and even to man-made violence) as compared to other group (Philip and Rayhan, 2004). People universally face risks and vulnerabilities but poor people, especially those living in rural areas depends on agriculture and in tropical ecologies face more than others do. Widely this is true in a large proportion of sub-Saharan Africa's (SSA's) population. According to Handley et al (2009), several numbers of risks and vulnerabilities derive and maintain poverty in SSA. Mostly it includes natural hazards, which brings the harvest failure, imperfect market that cases the market failure and volatility, conflict, and health related shocks.

Dercon and Krishnan (2000) reported that rainfall shocks, crop damage and livestock diseases are among the leading shock that make households vulnerable to poverty in rural Ethiopia. Another study considered that Ethiopia is a shock-prone country, almost all surveyed households

reports being negatively affected by shocks between 1999 and 2004 particularly drought shocks and illness shocks are the most important shocks. In a sense that households report these as being especially important and controlling for other household and village level characteristics, they are highly associated with lower levels of per capita consumption (Dercon and Hoddinott, 2005). They found that more than 50 percent of their surveyed households reported drought as the most important shock. The authors were able to show that experiencing a drought at least once during the five-year study period lowered per capita consumption by about 20 percent.

There is an extreme vulnerability, with the household consumption rising and falling dramatically from year to year resulting from drought, illness of household head, or other family health and death shocks. As a result, many families who are not currently poor are at constant risk of falling into poverty, and can never build up adequate amount of assets to get out of poverty (MoFED, 2005).

The Ethiopian government has introduced agricultural development lead industrialization as its main policy program accompanied with many poor targeting interventions to achieve sustainable economic growth and reduce poverty, and government has been constantly pursuing development efforts in addressing mainly rural poverty. These policies remain sound and about 44% of the population is below the nationally defined poverty line in 1999/00, while it is 45% of the rural population and 37% for urban areas. But, According to the 2010/11 HICES, only 29.6% of population is below national poverty line and the proportion of the population below the national poverty line stood at 30.4% in rural areas, while it is 25.7% in urban area (MOFED, 2012). This progress indicates that, there is a substantial poverty reduction over time. However, both statistical test and the stochastic dominance analysis confirmed that for all indices rural areas have higher poverty than urban areas.

In many developing countries, policies aimed at improving welfare through poverty reduction tend to target the current poor to the neglect of the most vulnerable. An understanding of household susceptibility to future poverty will be crucial for sustainable growth and development. Hence, any policy directed towards poverty reduction is required to take into account the vulnerability of current non-poor households (Novignon, 2010).

In general, poverty in everywhere is still a rural phenomenon and it's caused by dynamic factors that need persistent exploration to know its causes at a particular time. At the same time, vulnerability also strongly related to environment, climatic, and other nature disasters that hit rural household widely and its effects spread into the entire population (rural & urban). Thus, this study attempts to analyze the incidence, severity, nature and main determinants of poverty as well as vulnerability to poverty in the rural household of the Gubalafto woreda of Amhara regional state.

1.2 Statement of the problem

Over the last three decades, widespread poverty has prevailed in many Sub-Saharan African countries of which Ethiopia is the most affected one. Hence, Ethiopian government has carried out far-reaching institutional and policy reforms to achieve sustainable development. As a result, since 2007, Ethiopia has achieved strong and rapid economic growth, which is undoubtedly making the country as one of the highest performing economies in the sub-Saharan Africa. However, still now it remains one of the world's poorest countries. With considering the incidence and rural-urban poverty distribution, around 29 per cent of the population lives below the national poverty line (which is 3,781 Birr per adult person per year), 30.4 per cent of poor people live in rural area as compared to 25.7 per cent of urban poor. In addition, Ethiopia also ranks 174th out of 187 countries on the United Nations Development Programme's human development index, and average per capita incomes are considerably less than half of the current sub-Saharan average (UNDP, 2011).

Forty-eight of the 150 Woredas of the Amhara region are drought prone, suffer from frequent food shortage, and highly exposed for the persistent poverty situation and many households unable to produce sufficient foods to meet their food requirements throughout the year including the study area (UASID, 2000, cited by Aynalem 2008). MOFED (2002) indicates that the Amhara region has the smallest proportion of its population accessing safe drinking water and the average cattle holding per household, which is a good indicator of asset holding, is 3.6 that is lowest among the regional states of Ethiopia.

Although, total as well as food poverty decline in all regions over the past five years, food poverty increases from 32.5% in 1999/00 to 38.8% in 2004/5 to 42.6% in 2010/11 consecutively

in unexpected manner in Amhara region according to HICES (MOFED, 2012). Food insecurity directly related to poverty at the global, regional, national, and local levels (Sisay and Zegeye 2003). Hence, the increase in food poverty affects the overall poverty level and mostly food in-secured people more likely to be poor in overall poverty, and it is not guaranteed that the food in-secured people will be out of poverty.

The rural population in Gubalafto Woreda has suffered from a successive food deficit and famine. These have been aggravated by drought, land degradation, moisture deficit and decline in landholding caused by rapid population growth. To this end, as the PSNP implementation plan document of (MoARD, 2009) describes a total of 51,775 people (37% of the Woreda population) targeted to supply 3261.825 MT of food transfers in the year's period 2010-2014.

Most parts of the land are mountainous which is characterized by steep slope, and unsuited for agricultural purpose and highly exposed to soil erosion. As a result, the cultivated land is limited only to 36.42 per cent of the total area, and average land holding size for a household has been estimated to be 0.78 hectare (Mohamed, 2010).

According to the office of North Wollo food security and disaster prevention and preparedness report 2012, various interventions had been undertaken to strengthen the grassroots economy, as well as to improve the wellbeing of the household's living in all Woredas. However, the rural household emergency relief food aid dependents took the highest and stayed at a higher-level in the study area for the last five consecutive years as compared to other Woredas. Annually, around 35 percent of the total population was dependent on food aid in the last two years on average in this particular Woreda. It makes that the area considered being the highest food aid recipient woreda in North Wollo Zone. In addition, the study woreda, Gubalafto is located in the first drought prone zone of the region, and it is highly characterized by high level of deforestation and soil erosion caused by the interplay between some environmental and human factors.

Any development and Poverty alleviation strategies required information from current poverty status and the probability of future poverty (vulnerability to poverty). That is why; analyzing the individual, socioeconomic, community and other contributing factors of rural poverty as well as vulnerability in this particular study area is indispensable. In addition, it will help us to

document the level of poverty and vulnerability in the study area in particular, and to propose a possible solution to mitigate poverty and vulnerability at household level with a forward-looking antipoverty policy measures.

Currently, the observed growth in agricultural and other economic sectors in Ethiopia shows that the country going into achieving food security, reducing poverty and food aid dependency at national level. However, the persistent increase in food poverty in Amhara region and households lives in Gubalafto words highly vulnerable to the emergency relief food aid in particular initiates the researchers in the study area.

As to best of my knowledge no study dealing with poverty and vulnerability is conducted in the study area (Gubalafto woreda).Therefore, this study will attempt to fill this gap in addition to come up the solutions for the existing problems in this study area.

1.3 Objectives of the study

The overall objective of this research is to analyze poverty and vulnerability, and its major determinants in the study area. As part of the general objective, this research work intends to achieve the following specific objectives as well:

- To measure the extents, depth and severity of poverty, and vulnerability to poverty in the study area
- To identify the major determinants of welfare (consumption as a proxy), poverty gap and poverty severity, and vulnerability to poverty
- To measure the welfare (consumption expenditure) inequality in the study area
- To identify and assess the coping mechanisms used in responding against shocks

1.4 Research questions

To achieve the above-mentioned overall as well as the specific objectives, an attempt made to answer the following questions in the Gubalafto Woreda.

1. What are the extent, depth and severity of poverty?

2. What is the intensity of vulnerability to poverty?

3. What are the main determinants of household welfare, poverty gap and poverty severity?

4. What are the determinants of vulnerability to poverty?

5. What are the characteristics of households in poverty?

6. What is the intensity of consumption inequality in the study area?

1.5 Significance of the study

Having clear picture and information on the extents of poverty and vulnerability to poverty, its determinants at the grass root level can provide a basis for a detailed analysis in the poverty and vulnerability to poverty at the micro - level. A better understanding of factors affecting the household poverty and vulnerability to poverty at the micro level required by organizations concerned with community development, researchers, and development policy makers. The study also extended its scope and identified the major determinants of poverty gap and poverty severity that helps the policy maker to attack the severity of poverty.

In addition to this, the inclusion of vulnerability to poverty in this study also provides full information for policy makers about the study area such as, the extents of current poverty, vulnerable to poverty and their characteristics. Besides, the paper also identified the determinant of vulnerability to poverty at the micro - level, that helps policy makers to target vulnerable people using appropriate policy interventions to control the immediate causes of vulnerability instead of keeping themselves on poverty reduction instruments alone.

Moreover adding to the body of knowledge on the subject, the output of the study will also inform for donors and nongovernmental organizations interested to operate on the Woreda and it also serves as a stepping stone for the further studies.

1.6 Scope of the study

The study area was limited in Gubalafto Woreda, which is one of the drought prone areas in Amhara region and currently people in the study area were highly vulnerable to emergency relief food aid. In addition, the study deals with a limited number of households and mainly the finding focused on analysis of poverty and vulnerability in the rural household of Gubalafto woreda. The paper measures the extent of poverty, severity of poverty, vulnerability to poverty and its determinants using cross-sectional data. However, Poverty and vulnerability dynamics are remain beyond the scope of the study.

Another limitation of the study comes from the fact that, poverty is a multidimensional phenomenon. A host of deprivations can reflect the household or individuals' poverty. But, due to lack of enough resource (time and finance), the study limits its scope in the un-dimensional poverty (income poverty) with assuming that lack of money (inadequate spending) serves as a rough but quantifiable proxy for a host of deprivations.

1.7 Organization of the paper

The remainder of the paper structured in this part. Chapter two provides reviews both conceptual and empirical literature on poverty, welfare and vulnerability to poverty. Chapter three presented the discussion of survey methods, data types and econometric model specification used in this study. Chapter four revealed research findings including both the descriptive and econometric model estimation results and in chapter five, conclusion and recommendation were drawn and some further implications noted.

CHAPTER TWO

CONCEPTUAL AND IMPERICAL REVIEWS

2.1. Concepts of measuring welfare and its indicators

Welfare can be measured in different approaches, which are broadly classified into two distinct approaches, such that: 'wlfarist' and 'non-welfarist' approach. According to Ravallion 1992, the two welfare approaches distinguished one from the other based on the importance that attached to the individual's own judgment in relation to his or her well-being. The welfarist approach bases an evaluation of well-being exclusively on individual's utility levels. Hence, according to the welfarist approach, the value attached to commodities by the consumer himself and the subsequent preference ordering is sufficient for assessing a person's well being. But, the non-welfarist approach gives smaller attention regard to the information on utilities. It attempts to assess the well-being of an individual based on certain basic achievements such as being adequately nourished, clothed and sheltered. In relation to measuring the standards of living, the welfarist approach typically emphasizes aggregate expenditure on all goods and services that has to be consumed, ant it valued at appropriate prices, and also including consumption from own production, while the non-welfarist approach stressed on the specific commodity forms of deprivation, such as inadequate food consumption (Ravallion,1992).

In the empirical literature, it is familiar to analyze the determinants of poverty through relating measures of poverty of welfare to various individual, household, community characteristics and policy related factors in a multiple regression framework. This scheme makes it possible to recognize determinants and the effects of possible policy interventions on welfare (Singh, 1996).

In the welfare measurements, the most important issue is the choice of using whether individual income or consumption expenditure as welfare indicators. Consumption expenditure and income can be acceptable as a measure of welfare, since both measure the capacity to obtain goods and services. In several cases, the measures would produce similar results. However, in some cases consumption and income measure fails to take into account some important aspects of welfare. Such as consumption of commodities supplied by, or subsidized by the public sector including schools, health services, and roads and also several dimensions of the quality of life, such that,

consumption of leisure and the ability to lead a long and healthy life are not accounted by either consumption or income approaches **(**Engvall, 2006**)**.

In poverty analysis literatures consumption expenditure as a proxy for welfare indicator is widely implemented. According to Lipton and Ravallion (1993) in the most developing countries, consumption rather than income have been preferred as a measure of welfare indicators. This is because first current consumption provides information about incomes at other dates; it might be for the past or future. Hence, it considered as a good indicator of long-term average well-being. Second, income treated as a measure of welfare opportunity while consumption on the other hand considered as a measure of welfare achievements by households. Focusing on the realized instead of potential welfare is relevant. Third, it is regular that consumption fluctuates less than income, due to households or individuals smoothing their consumption. Households' not only financed their current consumption but also they responds to fluctuation in income by saving in the boom periods and dis-saving during lean periods in order to smooth their consumption.

As argued by Ravallion (1992), consumption contains smaller measurement error as compared to income; there is a belief that households are more willing to reveal their consumption behavior than they are willing to reveal their income. The actual consumption and expenditure determines the realized standard of living (Narsey, 2008; Silva, 2008). According to Mukherjee and Benson (2003), particularly in rural areas, income is often lumpy as farmers and subsistence households usually receive cash income during particular periods of the year. It means that, expenditure and consumption are a smoother measure of welfare than income.

2.2. Concepts and Measurements of vulnerability

2.2.1. Concepts and definition of vulnerability to poverty

The term vulnerability had been defined in so many meanings, and it has no universally accepted definition. Different researchers use the term vulnerability in different ways to elucidate their areas of concern. Inquiries concerned on natural hazards and epidemiology define vulnerability as an extent to which an exposed unit is vulnerable to being harmed by exposure to a perturbation or stress, in conjunction with its capacity to manage, recover or fundamentally to adapt or in an extreme case to go extinct (Kasperson and Kasperson, 2001). Adger and Kelly (1999) define social vulnerability as the exposure of groups or individuals to unexpected changes

and disruptions to livelihoods due to the shocks raised from social and environmental change, and vulnerability is a dynamic quality that can be altered suddenly or gradually by changes in the social and biophysical conditions.

Within the poverty and development literatures, vulnerability focuses on the aggregate measure of human welfare that integrates environmental, economical, social, health and other factors. Hence, it is defined as the risk of that, an individual or a household to fall below the poverty line or for those already below the poverty line, to remain in or to fall further into poverty (Bohle et al, 1994).

Vulnerability to poverty defined as the magnitude of the threat of poverty, measured ex- ante, before the uncertainty is resolved (Calvo and Dercon, 2005). Oni and Yusuf (2007) defined Vulnerability seeing that an ex-ante exposure to adverse outcome. It is also, considered as an ex-ante risk today that household or individuals will if currently poor remain poor, or if currently non-poor will fall below the poverty line in the next period.

Vulnerability refers to the likelihood of being hit by a given unpleasant event that amplified the likelihood of the lower income strata of the household to fall below the poverty line and also for those actually under the poverty line to stay in or go down further into poverty (united republic of Tanzania, 2008a).

Although poverty and vulnerability are conceptually closely related, technically they are different. Poverty is an ex-post measure of a household's well-being. It reflects a status of deprivation, of lacking the basic resources or capacity to satisfy current desires. In other words, it is an ex post realization of a state that indicates the welfare of an individual is below some cutoff point-poverty line that can be observed. Vulnerability, on the other hand, may be widely construed as an ex-ante measure of welfare, reflecting not so much how well off a household currently is, but what its future prospects are, and it is an ex ante expectation of the welfare of a household or individuals. So then, it is considered as expected poverty. What distinguishes the two is the presence of risk–the fact that the level of future well-being is uncertain. The uncertainty that households face about the future stems from multiple sources of risks such as harvests may fails, increasing food prices, the main revenue earner of the household member

may become ill, etc. If such risks were not present, there would be no distinction between vulnerability and poverty measures of well-being (Chaudhri, 2003).

The groups of poor as well as the vulnerable households or individuals are not identical since poverty is a static concept that reveals a situation in which someone by now finds himself, while vulnerability is a dynamic phenomenon indicating a situation in which someone can potentially fall into (Karfahis & Sarris, 2010).

Like poverty, vulnerability is a multidimensional concept, which required a more accurate representation of the multiple stresses that different people suffer. The same as poverty, it can be conceptualized in monetary as well as non-monetary space therefore it faces the same set of issues of welfare according to Chaudhuri et al (2001). Nevertheless, unlike poverty, the concept of vulnerability is onward looking and it is implicitly concerned about the uncertainty surrounding the future events. Poverty is usually treated in a static, no-probabilistic terms. Mostly poverty defined as some function of the shortfall of current income or consumption from a poverty line and thus the measure is a single point in time (Pritchett et al, 2000). Vulnerability to poverty, on the other hand, is the likelihood that a household will experience a future period of poverty. It measures the exposure to poverty rather than poverty outcome itself (Dercon, 2001).

2.2.2. Measurements of vulnerability

In the analysis of vulnerability, there are different methods that used to measure vulnerability to poverty, which required different data types. According to Hoddinott and Quisumbing (2003), there are three types of vulnerability assessments in econometric approaches, which used the household level socioeconomic survey data. The econometric method of assessment of vulnerability has its origin in poverty development literature. This approach of vulnerability measurement categorizes into:

2.2.2.1 Vulnerability as an expected poverty (VEP)

Under the construction of expected poverty measures, an individual's vulnerability is the prospect of that person becoming poor in the future if he or she is not poor currently, or the prospect of him/her continuing to be poor if he /she is currently poor (Christiansen and Subbarao 2004). Therefore, vulnerability defined as an expected poverty, and then consumption (income)

is used as a proxy for measuring households or individual's well-being. In the cases, vulnerability as an expected poverty measured by estimating the probability that a given shock or set of shocks will move household consumption below a given minimum level (such as a consumption poverty line) or force the consumption level to remain below the minimum if it is already below this level (Chaudhuri et al., 2002).

In conclusion, the most important weakness of this approach is that the use of estimations made across a single cross-section data requires the strong assumption that the cross-sectional variability captures temporal variability (Hoddinott and Quisumbing 2003).

2.2.2.2 Vulnerability as low expected utility (VEU)

According to Ligon and Schechter (2002, 2003) vulnerability can be measured as the difference between the utility derived from some level of certainty-equivalent consumption that it's equal or above which the household would not be considered as vulnerable (is analogous to a poverty line) and the expected utility level of the consumption.

The weakness of this technique is that it is difficult to account for an individual's risk preference, given that individuals are not well informed about their preferences, especially those related to uncertain events (Kanbur, 1987).

2.2.2.3 Vulnerability as uninsured exposure to risk (VER)

In the absence of complete effective risk management strategy, different types of shock that hit households result in a welfare loss to the extent that they lead to reduction of consumption. In this logic, it is a consequence of uninsured exposure to risk. According to Hoddinott and Quisumbing (2003), vulnerability assessment in this approach can be measured based on an ex post assessment of the extent to which a negative shock causes welfare loss and VER is designed to assess ex post welfare loss from a negative shock (e.g., a flood), as opposed to an ex ante assessment of future poverty in VEP. In order to measure the impact of shocks such as droughts, floods and hailstorms, this method required panel datasets containing the consumption levels of specific households before and after a specific shock, analyzes how households mange to smooth their consumptions over time, and classify households as vulnerable or less vulnerable.

In the VER methods, future consumption evaluated using an internal threshold, i.e. the person's current consumption position, as opposed to a socially defined poverty line (an external threshold). As a result, people at the very bottom may not be considered vulnerable, as they may not have experienced a large change in their consumption in response to a shock. At the same time, those among the non-poor who face a high probability of large adverse shocks resulting in large consumption changes may be considered vulnerable even though they are currently not to become poor in the face of such shocks (Christiaensen and Subbarao, 2004).

According to Novignon (2010), three types of vulnerability measurements have their own similarity and distinct characteristics: The VER approach request to capture the welfare loss a household experiences due to lack of successful risk management tools. This approach is analogous to VEP and VEU in that it is concerned with assessing welfare and welfare losses in a world where some risks are at best partially insured. The main differences between VER and the other approaches are that unlike VEP, it is backward looking: ex-post measure of welfare loss rather than an ex-ante welfare loss due to a negative shock. Secondly, unlike the other two methods, VER approach does not attempt an aggregate measure of vulnerability.

2.3 Poverty line

A poverty line indicates deprivation in an absolute sense, and it refers to the minimum level of income or expenditure deemed necessary to achieve the minimum requirements of life (well being). It is a line below which one is simply considered as poor and above which one is not. The poverty line may be thought of as the minimum expenditure required by an individual to fulfill his or her basic food and non-food needs, and it obtained by specifying a consumption bundle considered adequate for basic consumption needs and then by estimating the cost of these basic needs (World Bank, 2005).

However, the central question in the poverty analysis is how to set this arbitrary line in order to distinguish the households or individuals into two categories (I.e. Poor or non-poor). There are a number of approaches to set poverty line such as; direct calorie intake (DCI), food energy intake (FEI), and cost of basic need methods (CBN). Direct calorie intake method defined poverty line as the minimum calorie requirements for the individuals to survive and those who consume below a predetermined minimum level of calorie intake are considered to be below poverty. In

other words, DCI method simply measures poverty with malnutrition. However, this method does not take into account the non-food basic need requirements that are essential for survival and it does not give costs of acquiring the minimum calorie requirement. Therefore, if the interest is to measure poverty as lack of command on basic needs, it is unlikely to reveal the extent of deprivation for a given society.

The second one is the food energy intake method and it finds the consumption expenditure or income level at which food-energy intake is just sufficient to meet predetermined food-energy requirements for good health and normal activity levels (Ravallion and Bidani: 1994). It is an improvement over the direct calorie intake regarding to the representativeness of the poverty line since it provides the monetary value rather than a purely nutritional concept of poverty. It is simply determined by regressing the per capita consumption expenditure on calorie intake and the predicted value of the per capita consumption expenditure at the predetermined calorie intake level is taken as the poverty line. It takes not only a minimum nutritional requirement but also it take to account income or expenditure that deemed to be sufficient to acquire the minimum recommended calorie intake (Ravallion and Bidani: 1994).

However, in the case of FEI approach, the necessary point is to know that, either an individual meets the minimum level of calorie intake or not whatever the types of food baskets are consumed. Hence it affected by individual's preference, regional variations, activity level and relative price. As a result applying food energy intake method in different regions and over the periods even within the country yields inconsistent threshold and it does not provide robust poverty line.

The third and the most widely used method of setting a poverty line is the cost of a basic need method. In the CBN method, the food poverty line defined by selecting a 'basket' of food items typically consumed by the poor and quantity of the food basket scaling up or down until that the given bundle meets the predetermined level of minimum caloric requirement and valued at the relevant market prices. In this method, poverty is normally a lack of command over basic consumption needs and poverty line defined as the cost of basic needs (Ravallion and Bidani: 1994). After determining the food poverty line, adjustments are then made for non-food expenses.

2.3 Equivalence and economies of scale

Poverty analysis at an individual level is rare in the literature since individual unit poverty analysis raises logical difficulties and survey costs. Even, all members of a household can be identified and the survey could be undertaken in full detail at the individual level, it is too difficult to distribute a particular flow of earnings to one particular member in a household. Moreover, it is not easy to find out who consumes which component of a common pot of rice or pot of soup. In the socioeconomic survey, most information on consumption and income usually relates to the household level as a whole even though individual unit is an ultimate concern on poverty analysis.

Poverty and inequality analysis rely heavily on equivalence scales, as one has to compare income /expenditure of households of different size and composition. The simpler comparison of aggregate household income/ consumption is quite misleading about the true well being of individual members of a given household (Falter, 2006). Welfare measures using consumption per capita, this is simply dividing household expenditure for the number of household members overlooking the impact of household differential in size and compositions (age and sex). It gives equal weight for all household members (i.e. both children and adult members treated equally). In order to correct this critic, the most widely used equivalent scale is adult equivalence scale, ant it is computed by dividing household consumption by the number of 'adult equivalent' in the household instead for the total household members. Measuring consumption expenditure per capita does not answer the question of whether a large or small household are poorer.

Economies of scale exist in consumption such as housing, lighting and heating are some examples of household expense rather than individual's. For such items, a number of people living together can do so more cheaply, in per capita terms as compared to those who live separately. Lanjouw and Ravallion (1995) argue that even in food consumption there can be important economies of scale. Therefore, adjustment for both equivalence and economies of scale are needed.

2.4 Empirical Review

A poverty profile simply describes the pattern of poverty, but is not mainly concerned with explaining its causes. Poverty may be due to regional characteristics like ecological or geographical isolation, low resource base, shortage of rainfall, and other inhospitable climate, good governance, economic, political and market stability. It may be due to community level characteristics such as infrastructure, human resource development, access to employment, social mobility and land distribution; household and individual characteristics like the age structure of the family members, education, gender of the household head and the extents of participation in the labor force (World Bank, 2005). In general, education of household head and its members, demographic characteristics, and location have emerged as important determinants of household consumption and poverty in Fiji (Gounder, 2012). His study showed that larger families have significantly a propensity to have lower levels of per capita consumption, and Education of household head significantly and positively correlated with welfare and then improvement in education is one of the most effective ways of reducing poverty. In addition, variation of the geographical location also matters.

In their study of the causes of poverty in Sierra Leone, Fagernäs & Wallace (2007) found that 80% of the individuals in the rural households were poor and poverty was greater in the more remote districts of the country. The other remarkable observation made by the study is that the human capital, land size and share of children, which is measured by the proportion of children below the age of 10 in the household and that of adults between the age of 18 and 65 years, were significantly and positively correlated to the household consumption expenditure. On the other hand, household size is prime demographic factor, and negatively related to welfare status. A similar study by Andersson et al (2005) on the determinants of household consumption expenditure in Lao People's democratic republic (Lao PDR) in Southeast Asia showed that household size and dependency rations significantly lowered the household welfare whereas education and access to agricultural inputs are among the main important variables that enhanced the per capita consumption expenditure. McGregor and Litchfield (2008) undertaken a study on determinants of household poverty in Tanzania, and conclude that age of household head, asset value and education brings with its gains in welfare. While households with large family size, male headed and higher dependency ration significantly linked to an increase in the likelihood of

poor, and subsequent reductions in living standards. Moreover, access to Communication service (post office) is important evidence appears to have positive effects on household welfare.

The study conducted by Sharp and Devereux (2004) found that poor households in the Wollo region of Ethiopia face constrained by access to cultivated land, labor market, livestock ownership, social networks and adequate transfers. Another study conducted by Dercon (2004) and Dercon et al.(2005) indicated that rural households in Ethiopia were largely affected by a large number of shocks of different types such as drought death and serious illness and crop pests were the most important. In line with this, Dercon (2006) investigated poverty changes in rural households of Ethiopia over 1989 and 1995, and he was found that shocks encountered by rural households leads to changes in the returns to physical capital, particularly land, human capital such as education, and labor and location. Accordingly, his findings suggested that along with the short-run poverty impacts shocks in Ethiopia would have a serious negative growth implication.

Hagos and Holden (2003) studied in the analysis of poverty determinants in the rural households of Tigray 1997-2000, and they found that around 61 and 66 percent of the population in the region during 1997 and 2000 lived below the poverty line of meeting basic consumption requirements respectively. Consequently, they were revealed that, human capital resources like household's educated heads and the heads with any kind of acquired skills and Physical asset endowments such as farm size, livestock holding including oxen were found to have significant welfare enhancing effects. On the other hand, adult labor, both female and male were found to be highly significant and negative possibly underlining negative marginal returns to labor and the poor functioning of labor markets in the region. They also found that, households with poor access to markets showed positive improvements in welfare, and this might reflect that households far from the market are less vulnerable to external shocks as compared to the households with better access.

A study on poverty and its determinants among smallholder farmers in the eastern harangue highlands of Ethiopia by Bogale and Korf (2009), revealed that household composition in terms of (size per adult equivalent & dependency ration), access to irrigation and off-farm income significantly improves the household consumption expenditure and strongly correlated with

lower probability of being poor. In the same area, Bogale and Genene (2012) applied the similar methodology in poverty analysis and they found that around 38% of the sample households live in absolute poverty. Multivariate regression revealed that family size, educational level of any household member, size of own land, age of household head, livestock holding, amount of credit received, frequency of extension visit were the major significant variables that affect the household consumption expenditure, hence welfare.

Fredu (2008) examined the importance of demographic characteristics, education, households asset holding, community characteristics, off-farm income and access to public service in the poverty analysis under the works of poverty, asset accumulation, household livelihood and interaction with local institutions in northern Ethiopia using the three waves round panel data over the period 2004 – 2006. Accordingly, his finding showed that over the period 2004-2006, the incidence, depth of poverty and severity of poverty persistently declined. Hausman-Taylor model estimates revealed that, Age of household head, family size and access to market had an adverse effect on the household consumption expenditure per adult. While, physical asset holding such as oxen, current value asset holding and land size had a significant positive welfare gains. In addition, access to inputs such as fertilizers and seeds, access to irrigation had a positive and significant welfare improvement effect.

Demeke et al. (2003) analyzed the determinants of poverty in the rural Ethiopia using 1999/2000 rural household income and expenditure survey data under the works of growth, employment, poverty and policies in Ethiopia. Finally, they found that demographic characteristics such as family size at different age categories, livestock ownership, land holdings and education significantly associated with household consumption expenditure, except household size indicators the others determinants affect household welfare positively, and also households headed by males enjoy greater consumption per capita than their counterparts. Similarly, Jan et al (2008) assessed the determinants of poverty in the agricultural sector in Pakistan and indicated that dependency ratio and household head education, and physical asset holding (livestock and land size) were significantly enhanced households consumption per capita except the variable of dependency ration.

Asogwa et al. (2009) studied the determinants of rural household poverty severity in Nigeria using data from randomly sampled 233 rural farmers in Benue State. He found that the coefficients of dependency ratio and household size had a significant and positive relationship with poverty severity among the respondents. While, access to credit, access to agricultural extension service, household with market access, farm size and membership of cooperative societies or other farmers' associations had a significant and negative relationship with poverty severity. This implies that the poverty intensity strongly associated with household characteristics, asset holding, access to different public services and infrastructural facilities.

Tsehay and Bauer (2012) examine the dynamics and determinants of rural household poverty and vulnerability in the Northern highlands of Ethiopia using Ethiopian household survey data 1994-2010 in the two peasant associations; Shumsheha and Yetmen. They found that in the panel period, Shumsheha has shown a consistent decline in poverty incidence until 2004 however, it increased dramatically in 2010. On the other hand, the trend for Yetmen has been fluctuating throughout the panel. It means that poverty indices significantly varies over time and across the districts that it shows different causes may account for the household either being poor or not. Landholding, access to credit and agricultural extension services has welfare gains, but the household with large family size had lower consumption expenditure. In addition to this, the study also using 3FGLS estimation technique and they were found that the average vulnerability to poverty over the panel stood 43.01% and 36.23% in Yetmen and Shumsheha respectively. Literacy of the household head, access to credit, involvement on off-farm income and livestock holding had a significant and positive impact on reduction of vulnerability to poverty, and large household size significantly aggravates vulnerability.

Kuwornu and Owusu (2012) studied the consumption level, and emphasized on the role of irrigation on the farm household consumption expenditure in Ghana. The finding showed that irrigating households enjoy higher incomes and „better" welfare (household consumption per capita) than non-irrigating households, and the multivariate OLS regressions revealed that age of household head, access to irrigation water, access to credit and easy access to market were significantly and positively affects the household welfare, then it reduced the probability of falling into poverty. The study by Runsinarith (2011) examines the determinants of rural poverty in Cambodia using households surveyed in 2001, 2004 and 2008 and applying fixed effect

estimation panel regression analysis. He found that dependency ratio, large family size and shock had negative and statistically significant effect on household consumption expenditure. On the other hand, livestock, irrigated land and access to micro finance service were exerting positive and significant effects on per capita consumption expenses. Policies, which aim at dipping household size, curbing with shocks, encouraging ownership of productive assets, investing in irrigation and improving access to micro credit, will exert positive effects for reducing rural poverty.

Another study conducted by Yesuf (2007) poverty and vulnerability dynamics analysis using three round panel data in Tigray rural household 1997-2003. He was applying the cross-section data analysis using only 2003 observations on vulnerability to poverty following Chaudhuri (2003). His finding concludes that, even if there is some evidence of the dynamics in the rural poverty as one can infer from the transit components poverty, poverty in rural Tigray is chronic. The fixed effect regression result showed that male head and farm size had a significant welfare gain effects contradict to the effects of adult household members, number of children and number of juniors. In addition, OLS regression results on the correlates of vulnerability to poverty indicated that the household head age, education, livestock holding and number of seniors, farm size, members with primary education and members with secondary education were significantly correlated with the probability of becoming poor in a period ahead. Household with large family size had a higher level of vulnerability to poverty.

Alayande and Alayande (2004) made a quantitative and qualitative assessment of vulnerability to poverty in Nigeria. In the first case, they noted that the weak governance structure in the form of absence of rule of law, lack of political success and efficiency and low level of insecurity were the most important sources of vulnerability to poverty in Nigeria. However, quantitative assessments applied the Chaudhuri (2003) methodology to assess the level of vulnerability to poverty in Nigeria. The findings of the study showed that 87% of Nigerians were vulnerable to poverty and that 68.5% of the population was highly vulnerable, whereas only 31.5% of the population had a lower mean vulnerability. The study, while suggesting that building a strong effective and efficient governance structure can help to reduce vulnerability in Nigeria, also recommended a pro- poor growth macroeconomic policy environment that would allow the vulnerable and the poor to make use of their hidden assets.

Similarly, Christiaensen and Subbarao (2004) empirically assessed household vulnerability to poverty using pseudo panel data generated from repeated cross-section data, with historical information on shocks in Kenya. Their finding indicated that in 1994, rural households in Kenya faced on average a 40% probability of becoming poor in the future. The study also found that households in arid areas with large rainfall volatility were more vulnerable that those in non-arid areas. Idiosyncratic shocks also caused non-negligible consumption volatility. Possession of cattle and sheep or goats appeared ineffective in protecting consumption against aggregate shocks, though livestock holding (goats and sheep) helps to reduce the impact of idiosyncratic shocks, particularly in the arid zones.

Oni and Yusuf (2008) examined the determinants of expected poverty among rural households in Nigeria using General household survey (GHS) and the national consumer survey (NCS) of 1996. The cross-section data were analyzed using three-stage feasible generalized least squares (3FGLS) approach and found that both idiosyncratic and covariate factors affect the expected log per capita consumption of rural Nigerians, and the overall expected poverty in the country is around 0.53 which is 1.02 times the observed poverty in 1996. Higher expected poverty was highly correlated with living in the North East, no formal education, farming, older head of household, large household size and male-headed household. The study conducted in analysis of vulnerability to poverty in Ghana showed that, about 56% of households in Ghana were vulnerable to poverty and this is significantly higher than the observed poverty level of about 28%, which means that among the non-poor, some of them have probability to fall into poverty in a period ahead (Novignon, 2010). Households with higher family size were substantially worth off than those with small family members. Higher education attainments relate to lower levels of vulnerability to poverty. While household vulnerability to poverty tends to increase as the age of the household head increases and in Ghana male-headed households found to be less vulnerable to poverty that their counterparts.

Azam & Imai (2009) studied the ex ante poverty and vulnerability of households in Bangladesh using household income and expenditure survey (HIES) data in 2005. They found that poverty is not the same as vulnerability as a substantial share of those currently above the poverty line is highly vulnerable to poverty in the future. FGLS and OLS estimations revealed that, age of household head, total land size, participating in the safety net program, and infrastructural access

such as; electricity, telephone line and hygienic condition significantly correlated with household expected consumption expenditure but inversely related to the vulnerability to poverty. While household size, dependency ration illness of household heads and age square of household head negatively correlated with consumption expenditure per adult equivalent and positively associated with vulnerability to poverty.

Deressa et al., (2009) studied the farmer's vulnerability to climate extremes particularly droughts, floods and hailstorms, by employing the "vulnerability as expected poverty" approach using the data of 2004/2005 production year in the Nile Basin of Ethiopia. Through the analysis, logarithm of income used to substitute for the logarithm of consumption, with assuming most farmers in Ethiopia consume most of their farm incomes. They found that farmers' vulnerability is highly sensitive to their minimum per day income requirement (poverty line) and the agro-ecological setting. Moreover, it reveals that most of the surveyed farmers who reported taking action to deal with shocks experienced over the prior five years coped by selling livestock. Which means that livestock in rural household serving as an asset and insurance against shocks in addition as a source of power for farming and manure for fertilizer. The other utilized coping strategies also include borrowing from relatives, reducing consumption and depending on food aid. Moreover, depending on food-for-work and looking for off-farm employments are also other major coping mechanism in the study area.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Sources of data

To satisfy the stated objectives, the study used mainly primary data collected from a household survey in the study area. Structured questionnaire was used to collect information on household demographic composition, consumption expenditure (food and non-food expenditure), income, physical capital variables of household including livestock holding, human capital variables, idiosyncratic and covariate shocks that the household are exposured to and others aspects. In general, multipurpose questionnaire was used to collect the required data. The data collection process was held through a personal interview with the households on March 2013. Five enumerators were selected and they attended one day intensive training about the objective of the research, how to approach to the respondents, how to administer and forward the questionnaire and record responses as well as detailed contents of the questionnaire. The study also included secondary data from the Woreda (WoFED), Zonal food security and disaster prevention and preparedness office, and woreda agricultural office.

3.2. Sampling techniques

A mix of stratified, proportionate and systematic random sampling techniques was followed, which involves mainly two-step procedure. Gubalafto woreda has 34 PAs (Kebeles) with three agro-ecological zones: lowland (Kolla), mid-altitude (Weynadega) and highland (Dega). Thus, in order to get representative sample household, first the total number of PAs (Kebeles) stratified into three agroecologocal zones such as Dega, Weynadega and Kola. Based on the proportionate number of Kebeles in each agroecologocal zone, six PAs (Kebeles) selected randomly as follows:

Table 3. 1 Composition of sample kebels by agroecologocal zone

Agroecologocal zone	Number of kebele in each agroecological zone	Percentage of PAs.	Number of Kebeles selected from each agroecologocal zone
Dega	13	38.23	2
Weynadega	15	44.12	3
Kolla	6	17.65	1
Total	34	100	6

Second, the sample size from the randomly selected PAs (Kebeles) was determined based on the population size of the PAs. In this study, households are the major units of analysis. Then, sample household for the survey in each selected PAs (kebels) was based on systematic random sampling methods, which is sampling draw of every n^{th} element from a list (obtained from each PA's administrative office). Sample size determination takes into account both availability of limited resources and number of explanatory variables used in the econometric model regression. In general, the household survey conducted with 250 households and these total sample households are distributed as follows.

Table 3. 2 Composition of Sample households by Kebeles.

PAS(Kebeles)	Household size	percentage	Sample household
Shewat	1511	0.17	42
Dengolla	1563	0.18	44
Weyniye	2376	0.27	67
Geshber	1268	0.14	35
Zewergotra	1127	0.13	32
Dorogibir	1070	0.12	30
Total	8915	100	250

3.3. Description of the study area

The study conducted at Gubalafto worda, which found in North Wollo administrative Zone of the Amhara national regional state (ANRS). Gubalafto Woreda has three agroecologocal zones, lowland (kolla) that ranges from 1500-1800, mid-altitude (Weynadega) ranges from 1900-2200 and highland (Dega) ranges 2300-3300masl Woreda agricultural office (2012). Agroecological distribution of the study area accounts 17% of Kolla, 37% of Dega and 46% of Weynadega. According to Gubalafto woreda Environmental Protection, Land Administration and Use Office, most of the land is mountainous and characterized by steep slopes, unsuitable for agricultural purpose thus; the cultivated land is limited only to 36.59% of total land area, which is followed by 21.3% of degraded area out of 98,687.5 hr of the total land size. The average land holding size for a household is 0.78 hectare, which is ranging from 0.4 hectare in the highland areas to the 1.93 hectare in the lowland areas of the Woreda.

The major crops cultivated in the study area included teff, barley, sorghum, bean, chickpeas, lentil, maize, onions and garlic. The study area is highly prone to frequent shortage of rainfall and receives an annual rainfall ranging between 300-400 mm on average. Due to both man-made and natural calamities, the rural community in the woreda had not been able to produce sufficient amount of output to feed its population throughout the year. The production system is mainly mixed agriculture including crop and livestock farming. Crops are mainly produced for home consumption and household unable to meet their annual consumption from their own farm production. Households subsidize their consumption expenses by selling animals, which means that livestock ownership is an important for livelihood in the study area. Oxen are the main source of plowing power supply. In addition, there are about 104,439 cattle, 121,780 goats and sheep, 18,714 donkeys, horses and camels based on 2009 local livestock enumeration by the Woreda Agricultural Office (Mohammed, 2010).

3.4. Methods of data analysis

The study utilized both statistical tools and econometric models of data analysis. Descriptive data analysis like percentage, ratios, mean values, frequencies, etc using statistical tools (descriptive statistic, t-test) about the household characteristics, expenditure, asset holding and other relevant characteristic are used. The extent, depth and severity of poverty determined by using $P\alpha$ indices

of poverty proposed by **Foster Greer and Thorbecke**, distribution and decomposition of poverty indices obtained using DASP software and intensity of vulnerability to poverty are discussed in this part.

Under the econometric model of data analysis, the paper employed ordinary least square to assess determinants of household consumption expenditure per adult equivalent (proxy for household welfare) in the study area. Tobit model is also used in the analysis of covariates to poverty gap and poverty severity, and in the last but not the least, 3FGLS method also used to measure the level of household vulnerability and ordinary least square method is used to assess the determinants of rural household vulnerability to poverty.

3.5 Poverty measures

3.5.1. Setting poverty line

Three methods of setting the poverty line are discussed in the conceptual framework. However, the first two approaches are not commonly applicable due to the overlooking of food basket identification and lack of scaling of the quantities according to the corresponding nutritional requirements of age-sex profile of the individuals. Hence, in the study area, the CBN approach is used to estimate absolute poverty line.

In the CBN approach, first order ascendingly the households according to the consumption expenditure and the poorest 50% of the sample population identified as a reference group. The reason is that, the incidence of food poverty in Amhara region increases from 38.8 percent in 2004/5 to 42.6 percent during the 2010/11 (MoFED, 2012) even if the overall poverty decline in the above reference periods. In addition, the study area Gubalafto worda is also one of the drought prone and environmentally degraded area, the researcher believed that poverty in the study area to be above 50%. The food consumption behavior of the reference group also accessed to determine average quantities per adult equivalent of basic food items that make up the reference food basket. Second, the total calorie obtained from the consumption of average quantity per adult estimated based on the WHO food nutrition table. The average quantity per adult of each food item is scaled up and down by a constant value (ration of recommended calorie of per day per adult to the total calorie obtained by individual adult from consuming the average quantities) so as to provide the recommended calorie per adult per day. Third, multiply

each food item by the median price and sum up to get a food poverty line. Consequently, the necessary allowance for the basic non-food item was made to get a non-food poverty line and finally the total poverty line obtained by the sum of food and non-food poverty line.

In line with Ravallion and Bidani (1994), the mathematical formulation used to set food poverty line is stated as follows:

The total amount of calorie value obtained from the consumption of the specified basket of average quantity per adult by an individual is:

$$\sum \text{qiKcal}_i = T^* \text{ with } T \cong T^*. \text{ But } T \neq T^*$$

Where, T^* = total calorie obtains by individual adult from consumption of the average quantities.

q_i = average quantity per adult of food item 'i 'consumes by individual. Kcali = the caloric value of the respective of each food item ' i 'consumes by individual adult.

T = the value of nationally recommended calorie requirement per day per adult (in this case, 2200 kcalorie).

First, the average quantity per adult of each food item scale up and down by a constant value $\left(\frac{T}{T^*}\right)$ is obtained in order to get the exact value of recommended Kcalorie (2200 kcalorie per adult per day). Then, multiply each food item by the median price and sum up to get a food poverty line .The subsequent step is to estimate the non-food component of the total poverty line. The non-food share of total expenditure estimates through regressing the food share (si) of each household 'i' on a constant and the log of the ratio of total consumption expenditure to the food poverty line (Z^f):

$$S_i = \alpha + \beta \log\left(\frac{Y_i}{Z^f}\right) + \epsilon$$

Where, S_i refers to the share of food item from the total household expenditure, Y_i denotes household's total consumption expenditure, β regression coefficient α is the intercept which account the food share when $Y_i = Z^f$, and ϵ is simply referring the error term. Then after the

computation of the value of α, the non-food share of expenditures is $(1-\alpha)$ and then the total absolute poverty line is:

$Z^T = Z^f(2-\alpha)$ Where Z^T is total poverty line.

3.5.2. Poverty indices

Once the welfare measure as well as poverty line is determined, the remaining is to construct a single index to summarize the available information on the poor. There are a number of poverty indices developed by different scholars once Sen, 1976 bring the issue into the picture and put ground for its further development.

FGT (Foster Greer, Thorbecke (1984) group of poverty measure indices become the most popular class of poverty indices used in the theoretical and empirical studies of poverty in nowadays as compared to other poverty measure indices developed by (Sen, 1976; Foster, 1984; Foster and Shorrocks, 1984). FGT poverty measure is highly dominate and preferred to other poverty measures due to its ethical flexibility (captured by the parameterα), decomposability across subgroups, sub- group consistency, ability to capture the most desirable properties of a poverty indices and understandability. Therefore, these groups of poverty measures are used in this study. The FGT poverty measure is specified as:

$$P_\alpha = \frac{1}{N}\sum_{h=1}^{q}\left[\frac{Z-Ch}{Z}\right]^\alpha$$

Where, Z is the poverty line, q is the number of households below the poverty line, N refers to the number of households in the reference population/total sampled population, C_h denotes Per adult equivalent consumption expenditure of household h below the poverty line $(c_h \leq z)$ in time period t. Moreover, [1]α is a nonnegative parameter indicating the degree of sensitivity of the poverty measure to inequality among the poor. It is known as poverty aversion parameter.

when $\alpha = 0$, $p_a = \frac{n}{q}$, It refers as a head count ratio index and measures the proportionate of the poor households in the total population. This figure simply shows the incidence of poverty in the whole population. The head count index is insensitive to the distribution of income among the

[1] The value of á determines the relative weight given to the very poor in the index.
As á increases, greater weights are placed on the poorest.

poor and does not reflect the situation when the poor become poorer or poorer become less poor. It has provided a poor guide for the resource allocation since it unable to distinguish the barely poor households among the poor if the goal of policy maker is to reduce head count index. However, it used to assess the overall progresses in poverty reduction.

When, $\alpha = 1, p_a = \frac{1}{N Z} \sum_{i=1}^{q} (z - ch)$, the figure simply gives the poverty gap and it measures by how much income or consumption expenditure on average the poor far from the poverty line. Moreover, it could be understood as what amount of resources required on average to fill the gap that exists between the consumption of the poor and the poverty line. Like the head count index, poverty gap index fails the transfer sensitivity axiom.

When, $\alpha = 2, p_a = \frac{1}{N Z} \left(\sum_{i=1}^{q} (z - C_h)\right)^2$, This is a known as the severity of poverty. This index takes into account inequality among the poor in addition to the existing distance detaching the poor from the poverty line, and it gives a higher weight on those households further away from the poverty line.

3.5.3. Consumption inequality

Poverty analysis cannot end up without considering the existing consumption or welfare inequality. Hence, consumption or welfare inequality in the study area is analyzed using the Lorenz curve; which is defined as:

$$L(P) = \frac{\int_0^p Q(q)dq}{\int_0^1 Q(q)dq} = \frac{1}{\mu} \int_0^p Q(q)dq \qquad (1)$$

Where, $\int_0^p Q(q)dq$ sums of the consumption expenditure of the bottom P proportion

$\int_0^1 Q(q)dq$ Sums of the consumption expenditure of all the entire sample population in per adult (Araar, 2006)

Here, we defined that L (P) indicates the cumulative percentage of total expenditure held by a cumulative proportion P of the population. So that it is possible to infer two things given individuals are ordered in increasing consumption expenditure. One if a proportion p=0 of the population necessarily holds a proportion of 0% of expenditure which means that there is perfect

equality among the groups. Second, if a proportion p=1 of the population must hold 100% of aggregate consumption (such that perfect inequality among the groups).

When all sample households have the same expenditure (on both food and non-food), the cumulative percentage of total consumption held by any bottom proportion of the population in the study area equals to be P. The Lorenz curve would have been $L(P) = P$: population shares and shares of total consumption expenditure would be identical. Hence, the distance between zero inequality line and the Lorenz curve becomes, $P - L(P)$.

By aggregating the deficit between sample population shares and consumption expenditure share across all values of P between 0 and 1, we would get the well-known Gini-index of inequality and estimate the magnitude on welfare or consumption inequality of the society via the distributive analysis stata package (DASP) software.

$$\frac{\text{Gini index inequality}}{2} = \int_0^1 (P - L(P))dp \qquad (2)$$

3.6 Econometric model specification

3.6.1. Determinants of poverty

Determinant of poverty is modeled in a number of ways. However, in the literature there are two most widely used methods. One, poverty determinants assessed by regressing per adult equivalence consumption expenditure (as a proxy for households' welfare indicator) against a series of independent variables, i.e., variables that affect household consumption expenditure exogenously. Second, determinants of poverty can also be examined through a probit, or logit regression (estimate the probabilities of being in poverty), where the dependent variable is a binary variable taking the value of one when the individual is poor, and zero otherwise.

However, logit or probit model is strongly criticized by many researchers. Like (Ravallion, 1994; Datt & Jolliffe, 2005; Pudney, 1999; Coudouel et al, 2004; Simler, 2004; Fagernäs et al, 2007; Chaudhry et al, 2009; World bank, 2005) all are seriously criticize the construction of an artificial dependent variable, in which information about the actual relationship between the level of consumption and the dependent variable is lost.

Applying the data only on the poor is not efficient in the sense that it causes a loss of information as information on those households living above the poverty line is intentionally suppressed. It means that, all non-poor households are treated alike, as censored data Datt, et al; 2000 cited by Assefa, 2003.

In the binary model, there is an inherent arbitrariness about the exact level of absolute poverty line. Therefore, household consumption data would be censored at different levels, and the estimated coefficients of the poverty model would vary with the level of poverty line used.

In addition, using consumption model avoids strong distributional assumption which is required by the binary choice model, which are commonly used in modeling household poverty level directly (Ibid).

Multivariate associations between household welfare and other variables can identify connections that appear to be strong and it suggests causations (Appleton: 1995).

The major assumption of the level regression approach is that household consumption expenditure is inversely related to absolute poverty at all expenditure levels. As a result, any factors that increase consumption expenditure will reduce poverty.

Hence, the first approach is extensively used in many literatures and it was highly dominated the binary choice model, and in this study the researchers used consumption model instead of logit or probit.

3.6.1.1 Consumption model

The most widely used and standardized tool for assessing the correlates of poverty is multivariate expenditure regression. This regression can also estimate the partial correlation coefficients between consumption expenditure per adult equivalent and the possible included regressors. It enables to look why people are poor and remain poor over time. In addition, it enables to see the impact of household and demographic factors, specific individual as well as household head characteristics, asset holding, village factors, shocks and policy related variables.

The functional specification for the determinants of household welfare, in the study area applied a typical regression equation of semi-log linear regression functional form:

$$\mathrm{Log}(C_h) = \alpha + \beta' X_h + \epsilon_h \qquad (1)$$

Where, C_h is welfare indicator refers to consumption expenditure per adult equivalent of household 'h'. X_h is the set of exogenous determinants (independent variables), α is household's fixed effect that unobserved household heterogeneity, β' is the vectors of regression coefficients, and ϵ_h is a random disturbance term, which is assumed to be normally, independently and identically distributed with mean 0 and constant variance (Anderson et al, 2006; FeGounder, 2012). The logarithmic transformation of the consumption variable provides to reduce the usual asymmetry in the distribution of the error term and stabilizes the variance. Here, the ordinary least square (OLS) estimate of the model would give the average, systematic relationship between household welfare and the determinants of poverty. This model followed by (Demeke et al, 2003; Hagos and Holden, 2003; Audet et al, 2006; Mariara et al, 2006; Seetha, 2010; Simler et al, 2004) etc.

3.6.1.2. Determinants of poverty gap and poverty severity

Information obtained from consumption function may yield misguided policy recommendations, if the poor and the non-poor present different behavioral patterns and some of the hypothesized determinants of welfare may have different returns for the poor and non-poor. Therefore, in order to model the determinants of poverty gap and poverty severity, following Appleton (1995), a censored Tobit model is applied. The measure of household poverty specified as Pi, is given by:

$$P_i = \left(\frac{Z - C_h}{Z}\right)^{\alpha} \text{ if } C_h < Z \text{ And } P_i = 0 \text{ otherwise} \qquad (2)$$

Where, α is equal to 1 and 2, Pi refers to the poverty gap and poverty severity of the household h respectively, Z = poverty line and C_h denotes consumption expenditure of household in adult equivalent. Subsequently, modeling this would be equivalent to modeling a censored dependent variable, C_h^* equal to the consumption of the poor but fixed at the poverty line for the non-poor. That is to say,

$C_h^* = C_h$ if $P_i > 0$ And $C_h^* = Z$, otherwise,

Where, $C_h = \beta X_h + \epsilon_h$ if $P_i > 0$ (3)

Where, X_h is vector of determinants of welfare, β is a vector of parameters and ϵh denotes error term.

Hence, in this model, the consumption of the poor is determined with the error term assumed to be normally distributed and variance σ^2. In addition, the estimates of poverty function obtained by maximizing the log likelihood function (see Madala, 1983).

3.6.2. Vulnerability to poverty and its determinants

Assessing vulnerability helps us to investigate the sources and forms of risks that household's face. It enables us to distinguish between ex-ante and ex-post poverty prevention interventions, i.e., it helps us to design appropriate policy to reduce or mitigate risk, hence vulnerability to poverty.

The most important aim of a forward-looking vulnerability to poverty estimation is to have an estimate of household's over time mean and variance of consumption expenditures. To be efficient, this requires panel data collected over a sufficiently long period (Imai et al 2009). Such types of data are not available, particularly in developing countries (Holzmannn, et al. 2003). However, according to (Chaudhuri, 2003; Chaudhuri et al, 2002) the cross-sectional data have been advised to measure vulnerability, typically vulnerability as expected poverty (VEP) as a second- best solution. It is adopted by different researchers including (Novignon, 2010; Imai et al, 2009; Alayande et al, 2004; Oni and Yusuf, 2007; Jamal, 2009; Deressa et al, 2009) to estimate vulnerability to poverty.

Therefore, this study was followed Vulnerability as expected poverty (VEP) approach proposed by (Chaudhuri, 2003); Chaudhuri et al, 2002) for cross-section data in terms of its advantages to identify households exposed to risks but who are not poor. In this approach for a given household h, the vulnerability to poverty at current time defined as the probability of a household's per adult consumption expenditure being below the poverty line at time t+1:

$$V_{ht} = \mathrm{pr}(\ln C_{ht+1} < lnZ \mid X_h, Z) \qquad (4)$$

Where, V_{ht} is household 'h' vulnerability to poverty at time t, C_{ht+1} measures the household's per adult equivalent consumption expenditure at a time t+1, and Z refers to an appropriate household's consumption benchmark or poverty line.

The probability that a household falls into poverty depends on its expected (mean) consumption and its volatility (i.e., variance from an inter-temporal perspective) of its consumption stream. Therefore, both the household expected consumption and variance of its consumption are required to compute the level of household's vulnerability to poverty.

Assuming that for household h the data generation process for consumption captures in the following equation:

$$\ln C_h = \beta X_h + \varepsilon_h \qquad (5)$$

Where, C_h per capita consumption expenditure for household h, X_h denotes vector of observable household characteristics and other determinants, β is a vector of parameters, εh is a mean-zero disturbance term that captures unobserved factors (shocks) that would have affected households' consumption and assumed to be normally distributed. Here, some variables that include as covariate obtained from household self reports are to capture some level of shocks that households might have gone through such as; drought, flood, crop diseases, livestock diseases, hailstorm shock etc.

Besides, households future consumption will further assumed to be depends upon uncertainty about some idiosyncratic and community characteristics. Assuming constant variance of the disturbance term means that the household has a constant variance in the log consumption and then it contradicts to the existing reality and empirical evidence since poor households have more variation in consumption as compared to non-poor in most cases. Hence, in order to have a consistent estimate of parameters, it is necessary to allow heteroscedasticity, allowing variances of the disturbance term to vary, such that the variance of ε_h term varies across time as the explanatory variables vary in some parametric way and expressed as:

$$\sigma^2_{e,hh} = Z_h\theta + \jmath_h \qquad (6)$$

A three-stage feasible least squares (FGLS) procedure used to estimate β and θ. Here, equation (5), is first estimated using the ordinary least squares (OLS) procedure. Next, the estimated residuals from Equation (5) then used to estimate the following equation by OLS.

$$\hat{e}^2_{ehols} = Z_h\theta + \jmath_h \qquad (7)$$

The estimates (predicted values) from equation (7) which is $Z_h\hat{\theta}$ used to transform equation (7) as follows:

$$\frac{\hat{e}^2_{ehols}}{Z_h\hat{\theta}} = \left(\frac{Z_h}{Z_h\hat{\theta}}\right)\theta + \frac{\mu_h}{Z_h\hat{\theta}} \qquad (8)$$

Then, this transformed equation also estimated by using OLS to obtain an asymptotically efficient FGLS estimate, $\hat{\theta}_{FGLS}$. $Zh\hat{\theta}_{FGLS}$ is a consistent estimate of $\sigma^2_{e,hh}$.

The variance of the idiosyncratic component of household consumption used to transform equation (5) as follows:

$$\frac{\ln C_h}{\sqrt{Zh\hat{\theta}_{FGLS}}} = \left(\frac{X_h}{\sqrt{Zh\hat{\theta}_{FGLS}}}\right)\beta + \frac{\varepsilon_h}{\sqrt{Zh\hat{\theta}_{FGLS}}} \qquad (9)$$

OLS estimation of the equation (9) gives a consistent and asymptotically efficient estimate of β, $\hat{\beta}_{FGLS}$.

Then, estimated parameters β and θ that is obtained through three-step Feasible Generalized Least Squares (3FGLS) procedure ($\hat{\beta}$and $\hat{\theta}$) are used to estimate the expected log consumption and variance of log consumption for each household by:

$$\widehat{E}\ (\ln C_h|x) = \hat{\beta}X_h, \qquad (10) \text{ and}$$

$$\hat{V}\ (\ln C_h|x) = \ \hat{\sigma}^2_{eh} = \hat{\theta}Z_h \qquad (11)$$

Consequently, vulnerability level of household h which is the probability of that household h with characteristics $X_h$will be poor in the future would be estimated by assuming that households' consumption expenditures are log normally distributed, that is, vulnerability probability computed as:

$$\hat{V}_h = \widehat{Pr}(\ln C_h < lnZ\ |X_h)\ = \Phi\left(\frac{\ln Z - X_h\hat{\beta}}{\sqrt{\hat{\theta}Z_h}}\right) \qquad (12)$$

Estimated vulnerability to poverty depends on the distributional assumption of normality of log consumption, the choice Z, the expected level of log consumption and variability of log consumption.

In addition to this, the determinants of vulnerability to poverty will assess using ordinary least squares following Azam & Imai (2009). Thus, the model below applies to examine the idiosyncratic and covariant determinants of vulnerability to poverty of each household in the study area.

$$\widehat{V_h} = \pi X_h + \mu_h \qquad (13).$$

Where, $\widehat{V_h}$ is the estimated vulnerability of each household, X_h Is the vector of household idiosyncratic and covariant characteristics captured from household surveys, π is a vector of coefficients, μ_h is the error term.

3.7 Variable descriptions

3.7.1 Dependent variables

1. **Household's welfare (consumption expenditure as proxy)**

There exists considerable debate about whether to use income or consumption to measure household welfare. With having detail understanding about the two welfare indicators (income and consumption expenditure) and recognizing the advantages and disadvantages of each as a measure of welfare, which is described in the above conceptual framework, the paper follows the approach used by Ravallion (1992) in choosing consumption rather than income. Thus, household expenditure serves as a measure of welfare for the poverty analysis of the rural households and typically, the natural log of per adult equivalent household consumption expenditure used as the dependent variable in the regression analysis.

2. **Poverty gap and poverty severity (P_1 and P_2)**

The poverty gap (P1) measures the amount of money by which each individual falls below the poverty line, rather it simply shows the proportion of people falls below the poverty line. Similarly, square poverty gap measures the severity of poverty not the simply the incidence. It shows the severity of poverty by assigning each individual a weight equal to his/her distance from the poverty line. Hence, P2 takes into account not only the distance separating the poor

from the poverty line, but also the inequality among the poor (Hagos and Holden, 2003). Analyzing the Determinants of poverty severity and poverty gap become an important task to identify what are the basic factors that brings inequality among the poor.

3. **Household's vulnerability to poverty.**

Determinants of Household's vulnerability to poverty analyzing using level regression and binary choice model like poverty analysis. However, in most literature the level regression is widely applied to analyze the determinants of vulnerability to poverty (Imai et al, 2009 and Yesuf, 2007). Hence, each household's estimated vulnerability to poverty obtained from equation (12) regressed against the explanatory variables that are assumed to affect household's vulnerability to poverty.

3.7.2 Independent variables

Selection of the potential determinants of poverty depends on factors, which are likely to affect household welfare (importance of variables to determine poverty and vulnerability). Among the set of potential determinants of poverty, an attempt can give emphasis on choosing those variables that are arguably exogenous to current consumption. For instance, variables such as current school attendance by children and household durable consumption are excluded from the regression (regressors) for the reason that such variables are outcome, rather than determinants of current living standards. The literatures on the micro level determinants of poverty and vulnerability also used as guideline in selecting the relevant variables.

1. **Gender of the household head**: This is a dummy variable with 1 for male and 0 otherwise. Male-headed households are expected to have higher income compared to female headed-household because of better labor inputs used in male-headed households and mostly male have better opportunity to access income sources easily. Households with male headed had a significant impact on the household welfare (Datt and Jolliffe, 1997; Mariara, 2006; Andersson et al, 2006).

2. . **Age and Age Squared of the household head**: Age of household head is continuous variable expected to have positive associations with real consumption expenditure while age squared (a proxy for experience or old ages) to be negatively correlated with real

consumption expenditure as aged household heads face decrease in labor supply and decision making capability. Household head age had a significantly positive effect on the household welfare (Datt and Jolliffe, 1997; Bogale and Genene, 2012; Jan et al, 2008; Mariara, 2006; Similer et al, 2004).

3. **Literacy of the household head:** It is a proxy for the education level of the household head. Literate people are more willing to adopt technological advancement and have knowhow about how to improve their productivity. The educational level of a household head hypothesized to have a positive impact on the welfare of households as measured by real consumption expenditure per adult equivalent. The study by (Jan et al, 2008; Similer et al, 2004; Seetha, 20010) revealed that households with educated household head had a better welfare as compared to their counterparts.

4. **Dependency ratio:** The existences of a large number of children under age of 15and old age of 65 and above in the family affects the household consumption negatively. Households with higher dependency ratio will have the lowest welfare status due to the fact that a household with many dependents tends to exert more pressure on household resources and likely to have less consumption. Households with higher dependency ration had lower level of welfare, hence higher probability to fall into the poverty depth (Jan et al, 2008, Mariana, 2002; Datt and Jolliffe, 1997; Seetha, 2010; Engvall, 2006; Andersson et al, 2006).

5. **Household size:** Impact of household size on welfare status was mixing as shown in previous literatures. Here, it is hypothesized that household size affects the dependent variable in either way depending on the demographic composition of the household. It will have a positive effect if larger household size composed from working labor force (hence less dependency ratio) and will have a negative impact if it implies higher dependency ratio. At the same time, household size also expected to have an opposite impact on household's vulnerability as compared to its effect on welfare. According to (Datt and Jolliffe, 1997; Jan et al, 2008; Runsinarith, 2011; Bogale and Genene, 2012; Jan et al, 2008), household size and its composition matters the household expenditure per capita or per adult equivalent in an opposite direction.

6. **Households own land size:** It refers to the size of household owned land size; it can be measured in hectare or Timad. Land being an important asset and factor of production in the rural households, the households with larger land size holdings have better opportunity of obtaining more yields and hypothesized to have a positive impact on the household's consumption. Those who have less land size in an opposite manner expected to be more vulnerable to poverty (Datt and Jolliffe 1997; Runsinarith 2011; Hagos and Holden 2003; Fredu, 2008;) shows that household Owen land size significantly and positively affects the household consumption expenditure
7. **Number of oxen owned:** In the rural household ox is the most important primary sources of power in Ethiopia. In addition to this, oxen serve as sources of income and safeguard household at the time of hardship. Therefore, households having a large number of oxen expected to have higher consumption, hence, less vulnerable to poverty. Hagos and Holden (2003) reveal that number of oxen holding significantly affect the welfare status in the rural households of Tigray region.
8. **Livestock holdings:** Livestock units measured by TLU excluding oxen are an important asset for mixed farming smallholders. Livestock holding significantly and positively affect the household consumption expenditure (Mariara, 2002; Hagos and Holden, 2003; Bogale and Genene, 2012; Jan et al, 2008; Similer et al, 2004). Livestock holding expected to have positively associated with the welfare of households since it serves as a source of income from their products, their dung for cooking and as manure, and as a protective method against risk. Thus, households those who have large number livestock units are hypothesized to have a better welfare status, and being less vulnerable.
9. **Farm implements and household asset value**: In addition to oxen and other farming livestock units, a number of farm implements are used in agricultural activities and a number of household asset also available at households level. These assets are included in the model since different studies indicate that like livestock and oxen, the current value of asset holding significantly affects household welfare.
10. **Access to off-farm income (households with off-farm income):** Non-agricultural activities complement agricultural sources of income by availing the household additional resources for both consumption and investment. Off-farm involvement significantly affects the household consumption expenditure in many literatures, Mariara (2002) revealed that the off-

farm income participation significantly and positively affect household welfare. Hence, the availability of off-farm employment invites the households to engage in and generates additional resource, so then it suspects to improve household's welfare.

11. **Access to irrigation:** Households who have access to irrigation, will be capable to produce grain more than once per year, and being free from constraints of rainfall and those households with access to irrigated plots will have better consumption than those who do not. Access to irrigation significantly affects household welfare. (Fred, 2008; Hagos & Holden, 2003; Kuwornu & Owusu, 2011; Engvall, 2006) Likewise, household with irrigation access expected to have better welfare and it will have a greater role in reducing risk in scarcity of rainfall, hence vulnerability.
12. **Access to credit:** Access to micro-credit might help households to build up assets as it smoothes income and consumption, enhances the purchases of inputs and productive assets as well as provide protection against risks. Therefore, access to formal credit service supposed to be positively associated with household welfare and inversely related to the vulnerability.
13. **Access to extension services**: Agricultural extension services are organized and delivered to farmers in diffident ways and comprises multidimensional services in targeting to increase farmer's potential productivity and income. It includes provisions of advice on agricultural production techniques, opportunities, marketing, conservation and family livelihood. Transfer new technologies to farmers; facilitate development of local skills and organizations, improving agricultural productivity, profitability through increasing farmer's knowledge to adopt changes and innovation. According to Bogale and Genene, 2012, frequency of extension visits as a proxy significantly affects the household consumption expenditure, hence poverty.
14. **Access to inputs:** Inputs access such as fertilizers and seeds expected to have a positive effect on household welfare. Use of modern inputs like improved seeds, chemical fertilizer and modern tracing system supposed to boost the agricultural productivity. Hence, Households with access to modern inputs hypothesized to have higher levels of welfare.
15. **Distance from the main market:** Proximity to the market centers creates access to additional income by providing opportunities to involve in the off-farm employment and easy access to inputs, and reduces transportation costs, save time and creates opportunities for

selling agricultural products on time. Thus, remoteness from the market center expected to have negative impacts on household's welfare.

16. **Access to Infrastructure**: Accesses to different infrastructural facilities have a potential effect on the household's income earning capability. There are number of potential variables that reflect access to services. Variables related to infrastructure include the presence of public transport, health care center, education center, a public telephone, and all weather roads, availability of electricity in the area. Households live in the village with a large number of infrastructural facilities will have a better job opportunity and also have better health status that enhance their productivity and subsequently households welfare as compared to those who have less infrastructural facilities, and the reduce its vulnerability to poverty. Access to all weather roads and electricity at village level significantly and positively affects the household's welfare (Engvall, 2006).
17. **Shocks:** Rural households frequently experienced with different types of shock which may affect household's income and productive assets inversely, that in turn leads to a reduction in household consumption. Drought, flood, pests or diseases that will affect field crops, in-storage, livestock and weather related shocks like hailstorm and flood that affects field crop, causes of land degradation, consequently it lowers the household's income and exposed the households into unforeseen contingencies. In addition death of the household head, spouse or family members, illness of household head, spouse, or other family members are another type of shocks that households will be experienced. Thus, dummy variable included here to account different types of shocks that household will be experienced.
18. **Agro-ecological zone**: Dummy variables are included for each agro-ecological zone to capture some of the village specific covariate shocks. Dercon et al (2008) reveals that, even in the case of drought, no village where all households indicate having been affected equality for the last five years in Ethiopia. Thus, agro-ecological dummy variables included for each agro-ecological zone. The implication is that there might be some shocks identified by within agro-ecological variation, which may make identification of covariate shocks difficult.

Table 3. 3 Codes, definition and expected sign of the explanatory variables

Variable codes	Definition of explanatory variables	welfare (+/-)	vulnerability (+/-)
Household characteristics			
sexhh	1 if the household head is male, 0 otherwise	+	-
Agehh	Continuous variable refers to the age of the household head	+	-
Famsiz	Continuous variable, Number of family members in a household	+/-	-/+
depratio	Continuous variable of the ration of (children under age of 15 and old age of above 65 to active labor force)	-	+
headedu8	1 if the household head is at least primary school complete, 0 otherwise	+	-
Asset holding			
landsiadu	Continuous, Farm size per adult equivalent household size	+	-
oxendult	Continuous, number of oxen per adult equivalent	+	-
tluadult	Continuous, livestock holding per adult equivalent excluded oxen	+	-
totassetval	Continuous it measures the current value of asset holding	+	-
Access to services			
credacce	1 if household with access to credit,0 otherwise	+	-
accexte	1 if the household with access to extension services, 0 otherwise	+	-
inputuse	1 if the household used inputs in last production season, 0 otherwise	+	-
emplobuspar	1 if the households involves on own business, 0 otherwise	+	-
emplowag1	1 if the household involves in wage employment, 0 otherwise	+	-
dismar	Continuous, distance to main market center measured by hours	-	+
irrigacc	1 if the household has access to irrigation, 0 otherwise	+	-
villaifindx	Continuous, proportionate of village level infrastructural facilities	+	-
Shocks			
deathsho	1 if the household faces death shocks in the last 5 years,0 otherwise	-	+
drougtsh	1 if the household faces drought shocks in the last 5 years,0 otherwise	-	+
livedeasho	1 if the household faces livestock shocks in the last 5 years,0 otherwise	-	+
dega	1 if the agroecologocal zone is Dega, 0 otherwise	+/-	+/-
kolla	1 if the agroecologocal zone is kolla, 0 otherwise	+/-	+/-

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1. Socio-Demographic Characteristics of the Study Woreda

Gubalafto woreda has 34 PAs (kebels) with an estimated total population of 123,094, of whom 63,458 are men and 59,636 are women (CSA 2007). The woreda has three agroecological zones. Two of the sample PAs namely Shewat and Dengolla have *Dega* agro ecology and are located far away at a distance of 63 and 48 Km from the woreda center and 56 and 41 Kms from asphalt road respectively. The remaining three sample PAs (Zewergotra Weyniye and Gesho-ber) have Weyna Dega agro-ecology and are located at a distance of 26, 22 and 25 Kms respectively from the woreda center. Finally, the last sample PA (Dorogibir) has kola agro ecology and is found at a distance of 10 km from the woreda center. As mentioned deeply in the empirical review, household demographic and socioeconomic characteristics are among the major determinants of rural household welfare (consumption expenditure per adult equivalent). Accordingly, gender of the household head, household size, age of household head, dependency ratio, marital status, educational level, land holding and livestock unit are deeply addressed. Moreover, access to different services such as access to credit, access to agricultural extension services, irrigation and participation in the off-farm income (own business and wage employment) are also other major variables described below based on rural household survey data conducted in march 2013.

According to the data collected from the three agro-ecological zones, male and female-headed household accounts about 84.40% and 15.60% of the households respectively.

Table 4.1 Distribution of sample household across Kebeles (PAs).

Gender		Dorogibir	Weyniye	Gesho-ber	Zeworgote	dengolla	shewat	Total
Female	Freq	5	11	5	3	8	7	39
	%	16.67	16.42	14.29	9.38	18.18	16.67	15.60
Male	Freq	25	56	30	29	36	35	211
	%	83.33	83.58	85.71	90.63	81.82	83.33	84.40
Total	Freq	30	67	35	32	44	42	250
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: compute from own survey, 2013. %= percentage, freq. =frequency

Mean age of household head and the family: The average age of household head in the study area was 47.56 years with the standard deviation of 12.97 and the minimum and maximum age of household head stood at 22 and 91 years respectively. The average age for male-headed households is 47.48 years and that of female-headed households is 48.03. The average age of the family are 28.65 years with the standard deviation of 12.09 and the minimum and maximum average age of the family are 11.83 and 80 years respectively, in which male headed household have an average family age of 28.27 years and female headed household have an average family age of 30.96 years. This figure indicates that in both at the head and family level, male-headed households are a little bit younger than their female-headed counterparts. More than 95% of sample households found under the age categories of active labor force.

4.2 Average age and family size characteristics of the sample households

Mean age	Male		Female		Total	
Average age of household head	47.48		48.03		47.56	
Average age of household	28.27		30.69		28.65	
	Average age of the household by gender					
Household age category	Freq.	%	Freq.	%	Freq.	%
age <15	3	1.42	3	7.69	6	2.40
15<= age <=64	203	96.21	36	92.31	239	95.6
age >=65	5	2.37	0	0	5	2.00
Household size & dependency ratio						
Average household size	4.61		3.5		4.38	
Average adult equivalent size	4.02		2.77		3.83	
Average dependency ration	0.73		.85		0.75	
	Average household size category by gender					
Household size categories	Freq.	%	Freq.	%	Freq.	%
Family size <= 4	94	44.55	31	79.49	125	50
Family size (5-7)	111	52.61	8	20.51	119	47.60
Family size >=8	0	0	6	2.84	6	2.40

Source: compute from own survey, 2013. %= percentage, Freq. =frequency

Household size: In overall, the average family size in Gubalafto word is around 4.38 persons per household with a minimum of one person and a maximum of eight persons. The average family size of female-headed household is about 3.15 and is lower than their male-headed counterparts by an average of 1.46 persons per household. The difference in household size between male headed and female-headed households is statistically significant at (1%) level of significance .The average household size in adult equivalent unit is about 3.83. The figure for male and female-headed households is 4.02 and 2.77 respectively and the difference is significant at 1% level of significance.

Dependency ratio: Dependency ratio is the ratio of economically inactive household members with the age of below 15 years and above 64 years to the number of economically active household members, i.e., household members in the age category of 15-64 years inclusive. Accordingly, the average dependency ratio of Gubalafto woreda stood at 0.75 with minimum of 0 and maximum of 5. The figure is not significantly different between male and female-headed households, which is 0.73, and 0.85 respectively. Under the subsistence agricultural activity, higher level of dependency ratio leads to increase on demands for food and non-food basic needs without the addition of surplus income gains. Thus, higher dependency ratio contributes to food-insecurity, and the probability of a household to fall into poverty.

Educational level: In Gubalafto woreda, 67.6 % of household head were literate (able to read and write at the same time), and the remaining 32.4 % of household heads were unable to read and write. Literacy level is not the same for male and female-headed households. From the survey, 73.93 % of male-headed household were literate and while the figure for female headed households were 33.33 %. This figure shows that female-headed household had less chance to get access to education than male-headed households in the study area. In general, the majority of household heads (56.00%) in the study area did not have formal education. Only a small fraction of the household heads (4.4 percent) were secondary school complete.

Table 4.3 Household head educational level by gender

Education level	Male	Female	Total
Read and Write	73.93	33.33	67.60
Not able to read and write	26.07	66.67	32.40

Households head education categories by gender

Educational categories	Freq.	%	Freq.	%	Freq.	%
Household head without formal education	109	51.66	31	79.49	140	56.00
Household head with primary complete	94	44.55	5	12.82	99	39.60
Household head with secondary school	8	3.79	3	7.69	11	4.40
Total	211	100	39	100	250	100

Source: computed from own survey, 2013. %= percentage, Freq.=frequency

Marital status of the households: The marital status of household head is one of the main factors, which is deeply discussed in many literatures and has an economic meaning as a determinant of household welfare status**.** The majority of the household head (76.8%) in the area were married followed by divorced (14.8%), widowed (5.2%) and single (3.2%). As can be seen from Table 4.4, the largest percentages of divorced household heads are the female-headed in Gubalafto woreda.

Table 4.4 Marital status of household head by gender

Marital status	Male		Female		Total	
	Freq.	%	Freq.	%	Freq.	%
Married	190	90.05	2	5.13	192	76.8
Divorced	11	5.21	26	66.67	37	14.80
Widowed	3	1.42	10	25.64	13	5.20
Single	7	3.32	1	2.56	8	3.20
Total	211	100	39	100	250	100

Source: compute from own survey, 2013. %= percentage, freq. =frequency

4.2 Economic characteristics of the Gubalafto woreda

Equivalent to socio-demographic characteristics, household's basic economic endowments like landholding, oxen, livestock holding, farm as well household asset holding, off-farm income participation, access to different services (credit, agricultural extension service, input use) and access to food aid were the most crucial factors to determine household welfare (consumption expenditure per adult equivalent), poverty and vulnerability to poverty in the study area.

Landholding: The average size of land holding per household in Gubalafto woreda stood at 2.01 timad. The figure however is not the same for male and female-headed households. Male-headed households posses larger plot of land (2.13 timad) than female headed households (1.38 timad), which is significantly higher by 0.74 timad. Average holding of irrigated land in the area stands at 0.42 timad, with male-headed households possessing almost one and half times that of female headed households.

Oxen and livestock holding: In the study area oxen are the main source of agricultural power, and those households who have enough pairs of oxen can accomplish their farming activities on time and enable to cultivate their plot many times. Thus, households who possess large number of oxen are expected to have better welfare status, and hence lower level of poverty. The average oxen holding in the area stands at 0.86 oxen per household, with significant difference between male headed and female-headed households. Male-headed households possess almost one oxen per household whereas female-headed households possess on average only a quarter of an ox per household.

In the same situation, other livestock excluding oxen are also important means of sustaining livelihood of households in Gubalafto woreda. The main types of animals that the households in the study area keep include sheep, goats, donkey, camel and chicken, which are not only important source of income but also a means of consumption smoothing at times of failure of harvest due to drought, crop disease and other factors. The average tropical livestock unit per household stood at 1.34 in the study woreda, and like oxen holding distribution of livestock holding are not the same for male and female-headed households. Average tropical livestock unit for male and female-headed household were 1.5 and 0.49 respectively, and livestock holding

of female-headed household lowers by an average of 1.01 per household and the difference is statistically significant at 1% significance level.

Household asset holding (current asset value including farm and household asset): In addition to the livestock holding, households in Gubalafto woreda have different household and farm asset, which are used for production, consumption smoothing and providing services at home.

The overall average value of the current asset in the study area amounts to 1997.61 (ETB). In the same fashion the current value of total asset are not the same for both male and female-headed households, even if the difference is not statistically significant. The current average value of both farm and other household assets for male and female-headed households are 2150.98 and 1167.87 (ETB) respectively.

Table 4.5 Average asset holding of the household by gender

Items	Total	Male	Female	Difference	t-value
Landholding size	2.01	2.13	1.38	.7432282***	3.46
Irrigable land size	.40	0.42	.27	.15	1.47
Number of Oxen	.86	0.97	.26	.71***	5.85
Livestock unit (TLU)	1.34	1.5	.49	1.01***	3.94
Current asset value	1997.61	2150.98	1167.87	983.11	1.64

Source: compute from own survey, 2013. ***= significance level at 1%

Household involvement in off-farm activity and access to different service in the study woreda: The study found that, households in Gubalafto woreda participate in different off-farm activates to feed their family members. Around 75.2 % of respondents reported that insufficiency of farming income are the main cause that forces households to look for off-farm activities like employments for wage, employments on own business (petty trade, weaving, charcoal & firewood selling etc.). It seems that off farm activities in the study area are undertaken due to push factors.

As can be seen from table 4.6, 17.2 % of household in Gubalafto woreda were involved in own business activities like petty trade (grain, livestock and livestock products), weaving, selling firewood and charcoal, wood working activities. This figure indicates that, the very small

number of households was able to create their own business activities as compared to the total percentages of job seekers. In the study area, around 40% of the households participated in the employment in wage activities. In overall, around 50.8% of rural households participated in the off-farm activities in the Gubalafto Woreda.

Amhara Credit and Savings Institution (ACSI) is one of the main and dominant credit suppliers in the study area. Getting required amount of loan on time can reduce the input constraint on agricultural activities, and it enables to minimize the household resource constraints to involve in off-farm activities specially in creating and expanding own business activities. Thus, households with access to credit are supposed to have higher consumption expenditure than their counterpart. In the study woreda, 55.2% of household have credit to access.

Agricultural extension service is one of the Ethiopian agricultural productions boosting devices' accompanied with the use of modern inputs (chemical fertilizer, compost, improved seeds) and mechanizing agricultural sector. Thus, in the study woreda 92.4% of household heads had agricultural extension contact with development agents in the last main production season. In addition to this, the study found that 62.4% of household in Gubalafto woreda used modern inputs like improved seeds, chemical fertilizer and pest sides. Use of modern inputs highly varies across agroecological zones. In the last main production season the distribution of modern inputs users were, 79%, 14% and 0.07% in the Weinadega, kolla and Dega agroecological zones respectively. This figure shows that, there was a very small proportion of households in the Dega agro ecology who used modern inputs. Respondents confirm that the steep slope of the land in the Dega agro ecology is the main obstacle to use modern inputs like chemical fertilizer, and improved seeds since improved seeds are recommended to be used with chemical fertilizer. Moreover, households in the study area use compost on their farm and the study found that 70% of households in Gubalafto woreda used compost in the last main production season.

Gubalafto woreda is severely affected by the frequent drought, and then, having large number of households, those who were unable to feed their families from their farm income throughout the year and annually large number food-insecure households were demanding emergency relief food aid. In line to this, the study found that 43.2% of household in the study area received emergency relief food aid in the last 12 months before the survey conducted.

Many literatures confirm the relevance of Village level infrastructural services to determine household welfare, which is measured by consumption expenditure per adult equivalent. The household living in village with having access to electricity, primary and secondary school, clinic, public phone and other facilities supposed to have higher welfare. Average infrastructural index in the study area accounts 0.20 with a maximum and minimum of 0.93 and 0 out of 14 infrastructural facilities respectively. The study computes the village level infrastructural index by giving equal weight for all infrastructural facilities.

Table 4.6 Access to different services and facilities by gender

Items	Total	Male	Female	Differences	t-value
Employment on own business(1=yes)	17	16.59	20.5	-3.9	0.59
Employment on wage (1=yes)	12	12.32	10.25	2.07	0.36
Participation in food for work(1=yes)	34.8	32.22	48.72	-16.49**	1.99
Access to credit (1=yes)	55.2	56.87	46.15	10.71	1.24
Use of modern inputs(1=yes)	62.4	64.93	48.71	16.21**	1.97
Use of compost (1=yes)	70	74.88	43.59	31.29***	4.03
Access to extension services(1=yes)	92.4	92.8	89.74	3.15	0.68
Access to food aid (1=yes)	43.2	44.08	38.46	5.6	0.64
Village level Infrastructural index	20.09	18.34	29.56	11.22***	3.22

Source: compute from own survey, 2013. **=significance at 5 %, ***= significance at 1%

Household consumption expenditure by gender: In the study woreda, 43.6 % of household consumed 2 times per day and around 54.4 % of the household feeds their families three times per day. However, the remaining 2% of the households have food access only once per day. The study reveals that, in all components of consumption expenditure per adult equivalent household size (food, non-food as well as total expenditure) gender differential does not make statistically significant differences in the study area.

Table 4.7 Monthly average consumption expenditure for the household by gender:

Item	Total	Male	Female	Difference	t-value
Food expenditure per adult equivalent	328.93	330.01	323.09	6.91	0.21
Non food expenditure per adult equivalent	106.44	106.38	106.78	-0.39	0.03
Total expenditure per adult equivalent	435.37	436.39	429.86	6.53	0.17
The share of food in total expenditure	0.74	0.749	0.748	0.001	0.04
Adult equivalent household size	3.82	4.02	2.77	1.26***	5.35

Source: compute from own survey, 2013. ***= significance at 1%

4.3. Measuring poverty in the Gubalafto woreda

4.3.1 Poverty line in the study area

As mentioned in the methodology part, the absolute poverty line used in this study was derived using the cost of basic needs (CBE) approach, which involves 23 food items consumed by the poorest 50% of sample household accessed and used to construct the absolute poverty line. In the derivation of the poverty line and consumption expenditure per adult equivalent household size, the amount of consumption goods, which is measured by different units were converted into a single unit of measurement (k.g and litter) using the respective equivalent scales obtained from field works. Finally, the study used the median price in order to alleviate price variations from market to market, across agroecological zones, and people's preference. After identifying the food items consumed by reference household and make a necessary price adjustment, the amount of food items obtained from reference household determined based on the predetermined level of minimum calorie requirement. Then, the selected food items scaling up and down until the daily minimum calorie requirement per adult equivalent household size of 2200 Kcal achieved, and the amount of food items, which supplied the minimum calorie requirement valued at market price.

By having the median price, absolute food poverty line of 233.81 Birr per adult equivalent per month was derived, and the non-food poverty line also constructed by following the approach described in Ravallion and Bidani (1994) and finally 294.6 Birr per adult equivalent per month adopted as an absolute poverty line in this study.

Poverty line in the study area

Table 4. 8 Absolute poverty line of the study area per month per adult equivalent (ETB) at the current market price

Poverty line	Value at market price
Food poverty line	233.81
Non-food poverty line	60.79
Total poverty line	294.6

Source: compute from own survey, 2013.

This absolute poverty line reflects the current condition in the study area like price, consumption preference and tests of the households, norms, consumption habits. More or less, it also reflects the type of food items grown in the study area.

4.3.2. Poverty profiles

Given the poverty line estimated in the study area, households grouped into the poor (those who have not sufficient spending to meet the minimum calorie requirement per month) and the non-poor that the households having enough spending to acquire the minimum monthly calorie requirement. Accordingly, in Gubalafto Woreda 30.4 % of households are poor and the remaining 69.6% were considered non-poor at an absolute total poverty line. These figures emanated from the estimation of absolute poverty line based on adult equivalent consumption of basic needs, and then grouping people who spends below Birr 294.6 per adult equivalent per month considered as poor, and those who spend above Birr 294.6 are non-poor.

Head count index (P_0): Using the poverty line derived from household consumption expenditure survey, the poverty profiles in Gubalafto woreda described as follows. Table 4.10 reveals that 30.4 percent of households in the study area fall below poverty. This figure indicates the proportionate of households in the study area who are unable to meet their basic needs (both food and non-food). However, Head count index violates the transfer axiom and does not take into account the intensity of poverty (poorest of the poor). If a somewhat poor household gives transfer to a very poor household, the head count index would not be changed even though the well-being of the receiver might improve and poverty in overall has lessened. The head count index does not change when the people below poverty line become poorer and poorer. Therefore, it is only viable to target who is poor and non-poor.

Poverty gap (P_1): This measures the average proportionate poverty gap of consumption expenditure of the population where the non-poor households have zero poverty gaps. It indicates that how much would have to transfer to poor household to bring their incomes/ consumption expenditure up to the poverty line. The study found that the poverty gap in the study area is 6.46% in which at least 6.46 % of the poverty line should be transferred to the poor to bring the poor households into the poverty line. Poverty gap does not take into account the inequality among the poor since the poverty gap index is the mean over all people of the gaps between the welfare of the poor and poverty line.

Table 4. 9 Poverty profiles of Gubalafto Woreda

Poverty indexs	Food poverty at current market price	Non-food poverty at current market price	Total poverty at current market price
Head count(P_0)	37.2	25.6	30.4
Poverty gab ($P_{1)}$	9.43	6.71	6.46
Poverty gap square (P_2)	3.23	2.39	2.02

Source: compute from own survey, 2013.

Poverty severity (P_2): The measure reflects both the poverty gap and inequality amongst the poor, and the index give higher weights for those who far away from the poverty line. In other words, the higher the value of this index implying that the severity of poverty is higher. In the study area the poverty gap square (weighted sum of poverty gaps) is about 2.02%. In terms of food poverty line, 37.2% of household found below the food poverty line that is the food consumption expenditure per adult equivalent household size is below the stated food poverty line. Accordingly, the food poverty headcount index exceeds the overall head count index by 6.8%. This figure indicates that food poverty highly contributed that the total poverty index to be high. The features of food and total poverty head count index are also consistent and similar to the trends of poverty indices of rural household of Amhara region indicated by MoFED, 2012 report, which means that the food poverty headcount index was 44.6% whereas total poverty headcount index accounts about 38.8%. In the study area, food poverty index dominated the non-food poverty indexes in overall.

4.3.3. Poverty decomposition by Agroecological zones and across Kebeles

Poverty Decomposition by Agroecological Zones: The study found that the incidence, the poverty gap and severity of poverty are not the same across the three-agroecological zones in the study area. In all poverty indices, the highest proportion of the poor households were found in the kolla agroecological zone (40%), followed by the Dega agroecological zone (38.37%) and the least was in Weinadega agro ecological zone (23.5%).

Table 4. 10 Poverty Decomposition by Agroecological Zones.

Agroecologocal zones	Head count (P_1)	Poverty gab (P_1)	Poverty gap square (P2)
Dega	38.37	8.02	2.41
Kolla	40.00	9.24	3.03
Weynadega	23.13	4.83	1.54
Total	30.40	6.46	2.02

Source: compute from own survey, 2013.

Poverty Decomposition across Kebeles (Pas): Like poverty distribution across the three-agroecological zones, all poverty indices not evenly distributed across Kebeles in the study area. Referring the head count index, Shewat (in Dega), Dorogibir (in Kolla) and Dengolla (in Dega) show head count poverty index exceeding 30.4 percent.

Table 4. 11 Poverty decomposition across Kebeles

Agro-ecological zones	Name of Kebeles	Head count (P_1)	Poverty gab (P_1)	Poverty gap square (P_2)
Kola	Dorogibir	40.00	9.24	3.03
Weynadega	Weyniye	20.90	4.63	1.39
	Gesho-ber	25.71	5.97	2.52
	Zewergotra	25.00	4.00	0.78
Dega	Dengolla	36.36	7.14	2.18
	Shewat	40.75	8.94	2.65
	Total	30.40	6.46	2.02

Source: compute from own survey, 2013.

Similarly, the poverty gap and poverty severity index remain the highest in those Kebeles as shown in the above table 4.10. It implies that the poverty gab and the poverty severity index accounts above 6.46% and 2.02% respectively in the above three kebeles. To sum it up, low headcount, poverty gap and square poverty gap indexes were found in kebeles found in the Weynadega agroecological zone.

4.3.4. Poverty decomposition by Demographic and socioeconomic characteristics

Poverty decomposition by different demographic and socioeconomic variables enable to answer the question of "who the poor are" in the study area. The researcher used variables like gender of household head, family size, educational level of household head and asset holding (land size, oxen holding, other livestock holding, farm and household assets). Involvement in own business activities, involvement in employment on wage, access to irrigation, access to credit, access to extension service, use of modern inputs, distance to main market, and village level infrastructural facilities also used to decompose the poverty indexes.

As can be seen from table 4.12, decomposition by gender does not show significant differences in poverty between male and female-headed households. Household size on the other side is strongly correlated with poverty measures. Households with large family size larger than the average family size for the whole sample exhibit significantly higher poverty indexs as shown by all poverty indices (head count, poverty gap and poverty gap squared).

Results on table 4.12 also reveal that households with educated household heads have low level of poverty. In terms of the incidence of poverty, household head educational level does not make any statistically significant difference. However, considering the poverty gap and square poverty gap indexes household heads with having at least primary school complete have low level of poverty than otherwise.

The study indicates that poverty measures and household's asset holding have an inverse relationship in the Gubalafto worda. Households with oxen holding greater than or equal to a pair of oxen have significantly lower level of poverty than households who possess less number of oxen. Similarly households with livestock holding (excluding ox) greater than or equal to the average for the Woreda displayed significantly the lower poverty measures as compared to the households with livestock holding less than the average livestock holding of the Woreda.

Table 4. 12 Socioeconomic Decomposition of Poverty Indexes

Socioeconomic variables		Poverty indexes		
		Head count (P_0)	Poverty gap (P_1)	Poverty severity(P_2)
Sex of household head	Female	0.3077	0.0690	0.0220
	Male	0.3033	0.0637	0.0199
	t-test	-0.0230	-1.0823	-1.1061
Family size	<mean	0.192	0.0414	0.0126
	>=mean	0.416	0.0877	0.0277
	t-test	3.9614***	2.9313***	2.1999**
Number of adult	<mean	0.2177	0.0422	0.0118
	>=mean	0.3889	0.0866	0.0284
	t-test	2.9638***	2.7882***	2.4148**
Household head education	< grade8	0.3100	0.0665	0.0211
	>=grade8	0.2381	0.0431	0.0103
	t-test	-1.3009	-1.9497*	-2.5352**
Oxen holding	< a pair	0.3383	0.0753	0.0241
	>= a pair	0.1633	0.0203	0.0043
	t-test	-4.4669***	-5.4868***	-4.6084***
TLU	<mean	0.3355	0.0787	0.0263
	>=mean	0.2551	0.0426	0.0107
	t-test	-1.6650*	-2.7517***	-2.7753***
Land holding	< mean	0.3293	0.0596	0.0153
	>= mean	0.2917	0.0670	0.0226
	t-test	-0.4186	0.2981	0.6918
Current asset holding (value)	< mean	0.3696	0.0843	0.0271
	>= mean	0.1212	0.0095	0.0009
	t-test	-6.3133***	-7.0903***	-5.7101***
Current asset index	< mean	0.3759	0.0913	0.0307
	>= mean	0.2222	0.0342	0.0082
	t-test	-2.8436***	-3.8850***	-3.5378***
Irrigation access	No	0.3657	0.0692	0.0200
	Yes	0.2328	0.0592	0.0204
	t-test	-2.4678**	-0.6712	0.0664
Access to own business	No	0.3285	0.0704	0.0224
	Yes	0.1860	0.0362	0.0096
	t-test	-3.5150***	-3.2825***	-2.9835***
Access to employment on wage	No	0.2067	0.0369	0.0094
	Yes	0.4500	0.1060	0.0363
	t-test	5.0331***	5.2521***	4.7392***
Access to credit	No	0.3036	0.0727	0.0243
	Yes	0.3043	0.0579	0.0169
	t-test	0.0119	-0.8288	-0.9642
Access to input	No	0.3723	0.0802	0.0270
	Yes	0.2628	0.0552	0.0161
	t-test	-1.4135	-1.1731	-1.1949
Distance main market	>=mean	0.3673	0.0781	0.0238
	<mean	0.2632	0.0558	0.0179
	t-test	-1.4028	-1.0915	-0.6723

Source: compute from own survey, 2013.*, ** and *** significant at 10%, 5% and 1% respectively

Incidence, poverty gap, and square poverty gap of households with livestock holding greater than or equal to the woreda mean livestock holding amounts to 25.51%, 4.26% and 1.07%, whereas the figures for households who possess livestock less than the woreda average are 33.55%, 7.87% and 2.63% respectively.

The households with a land size greater than or equal to the woreda average land size have in effect lower poverty in terms of the incidence of poverty but have higher poverty in terms of the depth and severity of poverty although the difference is not statistically significant. Moreover, the study found that the households having non livestock asset holding greater or equal to the Woreda mean, exhibits significantly lower poverty levels in terms of incidence, poverty gap and poverty severity than those who have asset holding less than the mean.

Irrigated land is the other factor that results in differences in poverty levels. Households with access to irrigation have lower levels of poverty than households without access to irrigation.

Referring to the poverty incidence, poverty gap and poverty severity in table 4.12, households with their own business activities have significantly lower poverty measures than otherwise, and the difference is statistically significant in all poverty measures at 1% significance level. On the other hand, wage employment is positively associated with poverty. Households with involvement on wage employment have significantly higher poverty levels in terms of incidence, depth and severity than other wise.

The incidence of poverty is somewhat higher in the households with having access to formal credit but lower poverty measures in terms of poverty gap and poverty severity, and the difference are not statistically significant. The households those who used modern inputs in the last main production season displayed lower poverty indexes as compared to non-users although the difference is not statistically significant. Poverty is also positively correlated with distance to main market.

4.4 Econometric results and discussions

4.4.1. Determinants of household welfare

The study presented socio-demographic, economic characteristics, poverty profile and decomposition of poverty by agro-ecological zones and different population group widely in the previous section. However, the statistical description of socioeconomic characteristics and description of poverty profiles is not an end by itself in the poverty analysis. Further, it needs to examine the correlates of poverty using regression analysis in order to answer why the people are poor and see the impact of socioeconomic variables such as household characteristics, human capital, household asset holding, village level factors and different services provided by rural household development policy programs.

As described in the methodology part, the correlates of poverty are analyzed by welfare equation using OLS regression. The dependent variable is the natural logarithm of consumption expenditure per adult equivalent. Accordingly, the regression coefficients measure the percentage change in the dependent variable (consumption expenditure per adult equivalent) for a unit change in the explanatory variables, with ceteris paribus. Right hand side variables in the regression model included the household characteristics (household head age, sex, family size, mean age of household, number of children and dependency ratio, head education) and household asset holding (ox, other livestock, land size all are in adult equivalent household size, and current asset value both farm and household asset). It also included access to different services (agricultural extension services, credit access, and access to modern inputs), access to irrigation, village level infrastructural facilities, distance to the main market and shocks. Agro-ecological dummy also included to capture variation in the environmental shocks at agro-ecological zones.

Before doing the description of OLS regression results, the assumptions held in the regression of the model under investigation treated first and then followed by analysis of model results and discussions.

Multicollinearity Tests and Goodness of fit

Multicollinearity is a situation when two or more predictor variables in a regression model moderately or highly correlated or show little variation between them. The presence of

multicollinearity detected by different methods, such as examining pairwise correlations among regressors, examining partial correlations, examining Eigen values and condition index, and variance inflation factors. This study applied the most widely used methods of detection, such as high standard error, high variance inflation factor (VIF) and correlation matrix. In the regression outcome standard error are not so high, which indicates that the problems of multicollinearity is, not sever. Correlation matrix is less than 0.8 and variance inflation factor also less than 10 with the exception of the correlation between age and age square, which is expected to be high logically. Thus, the problem of multicollinearity is not an issue in this data.

Tests for omitted variables

Ramsey RESET test using the powers of the fitted values of lantotexpadul used to detect whether there is an omitted variable in the regression model. Using the stata software, the result shows that F (3, 221) = 0.96 and Prob > F = 0.4138 which means that, the model has no omitted variables.

Heteroscedasticity

Heteroscedasticity is a problem often encountered in cross section data and it occurs when the variance of the disturbance term is not constant as the value of independent variables varies. The study applied the Cook-Weisberg test for heteroscedasticity and the result indicates that chi2 (1) = 0.49 and Prob > chi2 = 0.4825. Thus, the Cook-Weisberg test accepts the null hypothesis, which is the homoscedasticity of the error term.

Endogenity

In the welfare analysis, another major problem is an endogenity problem. Thus, the researcher suspect this problem and identify some variables like family size, access to credit, employment on own business and wage. Applying Hussmann endogenity test, the result accept the null hypothesis that there is no endogenity problem in the data.

As can be seen from OLS regression result on household consumption expenditure per adult equivalent, F-value, 11.81 indicates that the overall model for the estimates of the OLS regression as a good fit and the model predict that 50.56% of total variation on consumption expenditure per adult equivalent explained by regressors included in the model.

Household Characteristics

Gender of household head is positively related to household welfare indicating that male-headed households have higher welfare than female-headed household although it is not statistically significant. In the rural area, agricultural activities required heavy labor force, and thus the result reflects it. Age and age square, are not statistically significant but it reflects the life cycle hypothesis, which mean that initially as age increase household income increase up to a certain limit and then it decrease as the age of household head increase.

The regression result shows that household size has a negative effect on household consumption expenditure measured by per adult equivalent. It is statistically significant at 1% significance level, and households with a large household size have a lower welfare than the households with having a small number of family size. This inverse relationship between consumption and household size is similar to the finding of (Fredu, 2008, Jan et al, 2008; Andersson et al 2005; Seetha, 2010;Gounder, 2012; Fagernäs & Wallace, 2007). Dependency ration has statistically significant positive effect on the household welfare at 5% significance level. In the area, households with a large number of dependents as compared to the number of adult household members have higher welfare. In another direction, this means that the households with a large number of adults have lower welfare than the households with small number of adults relative to the number of dependents. This might be due to poor functioning of the labor market, small land size (as a source of idle labor) and negative marginal returns to labor in the study area. This is also similar to the study of (Fagernäs & Wallace, 2007).

Asset Holding

Considering the asset holding, oxen are the main sources of plowing power in the rural household of Gubalafto worda. Oxen holding, which is measured by number of oxen per adult equivalent household size have a significant and positive effect on the welfare of the households and it is statistically significant at 1% significance level. Similar to the study of (Fredu, 2008; Hagos & Holden, 2003) households with large number of oxen per adult equivalent are less poor than their counterparts. Holding all other things remains constant, adding one additional ox per adult person increase the household welfare by 35.24%. Livestock holding excluding ox is positively associated with household welfare although it is not statistically significant.

Table 4.13 OLS regression results of household consumption expenditure per adult equivalent

Explanatory variables	Coefficient	Robust.Std. Err	t-value	p-value
Head male	0.0649	0.0668	0.97	0.332
Head age	0.0046	0.0115	0.4	0.687
Head age square	-0.0001	0.0001	-0.68	0.499
Mean family age	0.0022	0.0019	1.17	0.245
Family size	-0.0856***	0.0239	-3.59	0.000
Dependency ratio	0.0991**	0.0499	1.99	0.048
Number of children, 7-14years	-0.0477	0.0361	-1.32	0.187
Headedu8(>=primary school)	0.0986	0.1143	0.86	0.389
Oxendult	0.3524***	0.1155	3.05	0.003
Tluadult	0.0969	0.0642	1.51	0.133
Landsiadu	0.3739***	0.0770	4.86	0.000
Current asset value	0.00002***	0.000006	4.74	0.000
Employment on own business	0.1492**	0.0713	2.09	0.038
Employment on wage	-0.1497**	0.0604	-2.48	0.014
Irrigation access	0.0426	0.0664	0.64	0.522
Access to credit	0.0993*	0.0575	1.73	0.085
Access to exten	0.1661	0.1300	1.28	0.203
Input use	-0.0464	0.0822	-0.56	0.573
Access to aid	-0.0689	0.0514	-1.34	0.181
Village infrastructural index	0.1149	0.1196	0.96	0.338
Distance to market	-0.0006***	0.0002	-2.83	0.005
Drought shock	-0.0724	0.0720	-1.01	0.315
Death shock	0.0334	0.0760	0.44	0.661
Dega	-0.0229	0.1115	-0.21	0.837
kola	-0.1745*	0.0922	-1.89	0.060
_cons	5.8025***	0.3116	18.62	0.000
Number of obs = 250	F(25, 224) = 11.81		Prob > F = 0.0000	
R-squared = 0.5056	Root MSE = .35205			

///*, ** and *** refers to Significant at 10%, 5% and 1% Significant level respectively

Source: Compute from own survey, 2013

Land holdings of the households are closely linked to the household's welfare status. Landholding size, which is measured by land size per adult equivalent, has positive and statistically significant effect on the household's welfare. The households with large farm size have higher welfare, which is proxied by consumption expenditure per adult equivalent than the

households with small farm size. As land size per adult equivalent household unit increase by one timad, household welfare increase by 37.39% with ceteris paribus. This result also supported by the finding of (Datt & Jolliffe, 1997; Hagos & Holden, 2003; Fagernäs & Wallace, 2007; Demeke et al, 2003). In addition to this, non-livestock asset holding (both farm and household asset) is another important asset in the Gubalafto wereda with statistically significant and positive effect on household welfare. As a household's possession of current assets increases, its welfare level too increases implying a lower probability of falling into poverty. This is also similar to the finding of (McGregor & Litchfield, 2008). The coefficient of current asset value is statistically significant at 1% significance level.

Off-Farm Income Participation and Access to Different Services

Households with off-farm income activates generate additional income directly and they can boost their farming income by using off-farm income as a means of subsidizing their input constraint in the other direction. The study treats the effect of household involvement in off-farm income on household's welfare by separating off-farm income involvement into two components, such as employment on own business and the employment on wage. Employment on own business activity (petty trade and others) has a positive impact on household's welfare, and it is statistically significant at 5% significance level.

However, household participation in wage employment has a significantly negative effect on the household's welfare. It means that households engaged in wage employment have lower level of welfare than households not engaged in non-farm or households engaged in own business supporting the popular view that in many developing countries households are forced rather than attracted to enter into non-farm wage employment because of lack of other options.

Access to credit is another important variable, which affects the household welfare positively and significantly. The access to credit enables the households to minimize their financial constraints and helps to purchase oxen, fertilizer, improved seeds and other inputs. The coefficient of access to credit is statistically significant at 10% significance level. Holding other things remain constant, household's welfare status increases by 9.93% if the household gets credit access.

Village level characteristics

Village level infrastructural facilities have a positive effect on welfare even if it is not statistically significant. Access to main market is another village level characteristic, which has significant and negative effect on the household's welfare status. Results indicate that households closer to the main market have higher consumption per adult equivalent than households who live in remote areas far from the market. This is similar to the finding of (Fredu, 2008). The coefficient of the agroecological dummy has significantly negative impact on welfare, and the households living in the Kolla agroecological zone have a lower welfare status as compared to the households who lives in the Weynadega agroecological zone. The estimated coefficient is statistically significant at 5% significance level.

4.4.2. Determinants of poverty gap and square poverty gap (p1 and p2)

As described in the methodology part, censored regression model arise in case where the variable of interest is only observable under certain conditions. In the censored regression model the latent variable (C*) observed only if it is above or below some cut off point. If the latent variable (C*) is observed for everyone in the population, one could use OLS. However, a data problem arises in that the latent variable (C*) is censored from above or below. Thus, the Tobit model is an appropriate model because the latent variable (Ci*) cannot always be observed while the independent variable Xi is observed.

4.4.2.1. Determinants of poverty gap

Household Characteristics

The Tobit estimation result of the determinants of poverty gap is shown in table 4.14. Mean household age has a significant and negative relationship with the poverty depth, implying that households with younger family members have higher poverty depth. This is due to the reason that, as age increase the households would accumulate more assets; consequently, it reduces the intensity of poverty gap and probability to fall under the poverty gap. The coefficient of household size is statistically significant at 5% significance level, and positively correlated with the probability of falling into poverty gap. Considering the marginal effect of estimated coefficient, household's probability to falling into the poverty gap increase by 3.79% if the household size increase by one member.

Asset holding

Household asset ownership is strongly and negatively associated with poverty depth. Ox holding has negative and significant effect on poverty gap, and the coefficient is statistically significant at 1% significance level. Households with large number of oxen have lower probability to fall under the poverty gap as compared to the households with less number of oxen holding. The household's probability of falling into the poverty gap decreases by 44.60% for one every one additional ox possessed. Other livestock holding inversely associated with the poverty gap, implies that the households with large unit of livestock (TLU) have lower poverty depth as compared to their counterparts although it is insignificant. Another important asset with negative and significant relationship to household's poverty gap is farm size measured by land size per adult equivalent. The households with larger farm size are on average less poor than those who have small farm size. Households with larger farm size have a capacity to generate more income, which enable to enhance their consumption level and subsequently improve their household poverty status. The household's probability of falling into poverty gap decreases by 35.56% for every one additional timad of land gained.

The current value of asset holding is another important asset, which is inversely and significantly related to poverty depth. It affects the household's probability to fall into poverty gap, and the relationship is statistically significant at 1% significance level. Asset holding including farm asset and household asset used to generate income and serve as a means to cope up the households from adverse shocks. Households having a large value of current asset have a lower level of expected poverty gap than those who have small value of the current asset.

The coefficient of employment on own business and wage activities are statistically significant at 5% significance level. Employment on own business has a negative impact on the poverty gap implies that households with having their own business activities would have a lower probability of falling into the poverty gap, and lower the expected poverty gap as compared to the households not having their own business. However, the effect of employment on the wage is positive in relation to the intensity of poverty. Involvement in wage employment increases the expected level of poverty gab. The main reason for this extraordinary outcome mentioned in the above welfare regression analysis.

Table 4. 14 Determinants of poverty gap (Tobit model)

Explanatory variables	Coefficient	dy/dx	Robust.Std. Err	t-value	p-value
Head male	0.1050	0.0273	0.1803	0.58	0.561
Head age	0.0148	0.0041	0.0393	0.38	0.707
Head age square	0.00003	0.00001	0.0004	0.08	0.937
Mean family age	-0.0174*	-0.0048	0.0090	-1.93	0.055
Family size	0.1379**	0.0379	0.0666	2.07	0.040
Dependency ratio	-0.1741	-0.0478	0.1469	-1.18	0.237
Number of children (7-14 years)	0.1410	0.0387	0.1041	1.35	0.177
Headedu8(>=primary school)	0.3712	0.1254	0.3438	1.08	0.281
Oxendult	-1.6239***	-0.4460	0.4835	-3.36	0.001
Tluadult	-0.3527	-0.0969	0.2725	-1.29	0.197
Landsiadu	-1.2947***	-0.3556	0.3076	-4.21	0.000
Totassetval	-0.0003***	-0.0001	0.0001	-4.56	0.000
Employment on own business	-0.4507*	-0.0987	0.2470	-1.83	0.069
Employment on wage	0.4497***	0.1320	0.1712	2.63	0.009
Irrigation access	-0.0491	-0.0135	0.1833	-0.27	0.789
Access to credit	-0.4022**	-0.1141	0.1582	-2.54	0.012
Access to exten	-0.5589**	-0.2063	0.2435	-2.3	0.023
Input use	0.2142	0.0566	0.2044	1.05	0.296
Access to aid	0.0461	0.0127	0.1552	0.3	0.767
Villaifindx	-0.5544	-0.1523	0.3807	-1.46	0.147
Distance to market	0.0015*	0.0004	0.0008	1.94	0.053
Drought shock	-0.0089	-0.0025	0.1706	-0.05	0.958
Livestock shock	0.1856	0.0548	0.1796	1.03	0.303
Dega	0.2672	0.0780	0.3358	0.8	0.427
Kolla	0.7665***	0.2959	0.2717	2.82	0.005
_cons	0.1343	-	1.1221	0.12	0.905

Number of obs = 250 LR chi2(25) = 141.35 Prob > chi2 = 0.0000
Log likelihood = -139.07952 Pseudo R2 = 0.3369
///*, ** and *** refers to Significant at 10%, 5% and 1% Significant level respectively
Source: Compute from own

The coefficient of household's access to credit is statistically significant at the 5 % significance level and has a negative impact on the gab of poverty. Households with access to credit have lower probability of falling into a poverty depth than households without access. Similarly, the coefficient of household's access to agricultural extension service is statistically significant and

has a negative relationship with the poverty gap. With respect to the marginal effect, having agricultural extension contact reduced the probability of being in a poverty depth by 24.35%, holding other things remain constant. This is due to the reason that, contact with extension services provided more access to improved seeds, new production system, and other modern inputs and the knowledge that how to diversify their income sources and how to utilize it. Accordingly, access to agricultural extension service improved the farmer's productivity, and then it reduced the poverty intensity.

Distance to the main market has a significant and positive effect on the poverty gap, and it is statistically significant at 10% significance level. The households with a better access to main market have lower probability of being in a poverty depth. This might be due to the reasons that access to market improves farmer's liquidity and the affordability of the inputs required for production, and it creates other job opportunities like employment on wage, petty trade, as well as it reduces the time wastage. Agroecological variation also has a significant effect on the poverty gap similar to its effect on welfare analysis. Households living in the kolla agroecological zone are poorer than those who live in the Weynadega agroecological zones. It implies that poverty intensity is highly severe in the kolla agroecological zone as compared to the other agro ecologies.

4.4.2.2. Determinants of Poverty Severity

In the above section, the study discussed on the correlates of poverty gap, and the finding of the study revealed that, household characteristics, asset holding, off-farm income participation, access to credit and agricultural extension services, remoteness to the main market and agroecological variation are significantly affecting the poverty gab in the study area. Similarly, the Tobit model once again estimated to identify the determinants of the poverty severity. Accordingly, in the same condition with determinants of poverty gab, household characteristics such as family size and mean household age significantly affects the poverty severity. The households with a large number of family members have a higher probability of falling into the poverty severity than those who have a small number of family sizes and the households with aged family members have a lower probability to fall into poverty severity.

Table 4. 15 Determinants of poverty severity (Tobit model)

Explanatory variables	Coefficient	dy/dx	Robust.Std. Err	t-value	p-value
Head male	0.1837	0.0178	0.2910	0.63	0.528
Head age	0.0283	0.0029	0.0632	0.45	0.654
Head age square	0.00001	0.000002	0.0006	-0.02	0.980
Mean family age	-0.0275*	-0.0028	0.0147	-1.88	0.062
Family size	0.2117*	0.0217	0.1211	1.75	0.082
Dependency ratio	-0.2822	-0.0289	0.2533	-1.11	0.266
Number of child, 7-14years	0.2007	0.0205	0.1695	1.18	0.238
Headedu8(>=primary school)	0.3656	0.0418	0.5929	0.62	0.538
Oxendult	-2.3248***	-0.2378	0.8157	-2.85	0.005
Tluadult	-0.5549	-0.0568	0.4419	-1.26	0.211
Landsiadu	-2.1884***	-0.2239	0.5483	-3.99	0.000
Totassetval	-0.0005***	-0.0001	0.0001	-4.48	0.000
Employment on own business	-0.7619*	-0.0623	0.3891	-1.96	0.051
Employment on wage	0.8256***	0.0893	0.2931	2.82	0.005
Irrigation access	0.0737	0.0076	0.3241	0.23	0.820
Access to credit	-0.6484**	-0.0679	0.2669	-2.43	0.016
Access to extension serv.	-1.2582**	-0.1654	0.5328	-2.36	0.019
Input use	0.0517	0.0053	0.3848	0.13	0.893
Access to aid	0.0823	0.0085	0.2404	0.34	0.732
Villaifindx	-0.9046	-0.0925	0.5955	-1.52	0.130
Distance to market	0.0026**	0.0003	0.0013	1.99	0.048
Drought shock	0.0657	0.0066	0.2663	0.25	0.805
Livestochock	0.2315	0.0249	0.2781	0.83	0.406
Dega	0.1768	0.0185	0.5898	0.3	0.765
Kolla	1.0383**	0.1326	0.4463	2.33	0.021
_cons	0.4518	-	1.8667	0.24	0.809
Number of obs = 250	LR chi2(25) = 135.55			Prob > chi2 =	0.0000
Log likelihood = -170.64012	Pseudo R2 = 0.2843				

///*, ** and *** refers to Significant at 10%, 5% and 1% Significant level respectively
Source: Compute from own survey, 2013

The coefficient of the household's asset holdings, such as ox, farm size and the value of current asset have statistically significant and negative impact on the probability and intensity of poverty severity**.** Similar to the finding in the determinants of poverty gab, households with a large number of oxen, large farm size and more value of current asset has a lower level of predicted

poverty severity or probability of falling into poverty severity. This is similar with the finding of (Chijioke, 2012; Asogwa, 2009).

The coefficients of household's Off-farm income involvement such as households with own business and the employment on wage have a statistically significant effect on the poverty severity with the similar sign in the determinants of poverty gap. Households with access to agricultural extension services and access to credit have a significant and negative relationship with poverty severity. This is also similar to the finding of (Asogwa, 2009).

Moreover, the coefficients of household's distance from main market and Agroecologocal dummy have significant and positive impact on the poverty intensity. The households in the remote area have a higher poverty severity than those who lives nearer to the main market. This is also similar to the finding of (Asogwa, 2009). The households living in the Kolla agroecological zone have higher poverty intensity than the households living in the Weynadega agroecological zone.

In general, all the determinants of poverty gap appear as the determinants of poverty severity, and then that is why the significant determinants of poverty severity explained in short with relation to poverty gap.

4.5. Extents and determinants of vulnerability to poverty

4.5.1. The extents of vulnerability

Formulated poverty alleviation policy based on the extent of currently poor people may not consider the incidence of poverty in a period ahead (future poverty).

Poverty analysis provides only an ex-post measure of household's welfare as an input for poverty reduction strategies. However, such kinds of studies do not provide a tool for a priori prevention of poverty incidence because of unexpected contingencies. Therefore, analysis of vulnerability complements poverty analysis through providing an ex-ant measure of welfare.

Applying the methods specified in the methodology part of this paper, an estimate of vulnerability for each household is generated. Considering the estimated vulnerability to poverty of the households, on average 37.42% households are vulnerable to poverty. It implies that there is a probability of around 0.37 of falling into poverty in a period ahead that is the head count poverty index in the next period. In line with Chaudhuri (2003), adopting the focal point to be

0.5 where the household becomes vulnerable to poverty (those who have an estimated vulnerability level greater than or equal to 0.5), 35.08 % of the households found vulnerable to poverty. Like the extents of poverty decomposition by the gender of household head, decomposition of vulnerability to poverty does not show a significant difference between male and female-headed households. The figures are 35.55% for male-headed households and 32.43% for female-headed households.

4.5.2. Determinants of vulnerability

Like the analysis of poverty, measuring the extent of vulnerability to poverty and its description are not an end in the works of vulnerability studies. Hence, finding the factors that contribute to the vulnerability to poverty requires the regression analysis. The study used OLS regression analysis to identify the factors, which affect household's vulnerability to poverty. The dependent variable here is household's vulnerability to poverty generated by using 3FGLS estimation of the household vulnerability to poverty explained by the independent variables such as household characteristics, human capital, households asset holding, off-farm income participation, access to different public services, village level infrastructural facilities, environmental and health related shocks and agroecological dummies. The estimated results of OLS regression presented in table 4.16.

Household Characteristics

The coefficient of the age of household head has a negative and significant effect on the household's vulnerability to poverty, and it is statistically significant at 1% significance level. This indicates that the household's vulnerability to poverty decrease as the age of household head increase. This is due to the reason that as the age of the household head increase the household acquire more skill and experience about the farming activities, and accumulated assets that used to alleviate the household's vulnerability to poverty.

Age square of the household head is positively, and significantly correlated to the vulnerability to poverty and statistically significant at 1% significance level. Consistent with the lifecycle effects, the age of the household head and its squared are negatively and positively correlated to the vulnerability to poverty respectively. This is similar with the result of Yesuf (2007).

Table 4. 16 Correlates of Vulnerability to Poverty (OLS Regression)

Explanatory variables	Coefficient	Robust.Std. Err	t- value	p-value
Head male	0.0705**	0.0314	2.25	0.026
Head age	-0.0471***	0.0047	-10.09	0.000
Age square	0.0004***	0.0000	9.52	0.000
Mean family age	-0.0035**	0.0017	-2.12	0.035
Family size	0.0144	0.0108	1.33	0.183
Number of Juniors	0.0355	0.0262	1.36	0.177
Number of child, 7-14years	0.0859***	0.0301	2.85	0.005
Dependency ratio	0.1370**	0.0590	2.32	0.021
Headedu8(>=primary school)	-0.0269	0.0207	-1.30	0.194
Oxendult	-0.1228***	0.0327	-3.75	0.000
Tluadult	0.0211	0.0181	1.17	0.243
Landsiadu	0.0396	0.0277	1.43	0.153
Totassetval	-0.00001***	0.000003	-4.95	0.000
Employment on own business	-0.0513***	0.0193	-2.66	0.008
Employment wage	0.0174	0.0149	1.17	0.243
Irrigation access	0.0154	0.0183	0.84	0.401
Access to credit	-0.0756***	0.0180	-4.20	0.000
Access to extension serv.	-0.0488*	0.0251	-1.95	0.053
Input use	-0.0130	0.0273	-0.48	0.633
Villaifindx	-0.1096***	0.0413	-2.66	0.008
Distance to market	0.0003***	0.0001	3.23	0.001
Drought shock	-0.0015	0.0207	-0.07	0.942
Livestock shock	0.0021	0.0133	0.16	0.872
Dega	0.0332	0.0373	0.89	0.374
Kolla	0.0902***	0.0270	3.35	0.001
_cons	1.4125***	0.1285	10.99	0.000
Number of obs = 248	F(25, 222) = 62.96	Prob > F = 0.0000		
R-squared = 0.8567	Root MSE = .10718			

///*, ** and *** refers to Significant at 10%, 5% and 1% Significant level respectively
Source: Compute from own survey, 2013

The coefficient of dependency ratio and the number of juniors has a positive and significant impact on the household's vulnerability to poverty. This implies that the households with a large number of household members under the age of 14 years and above 64 years have a higher level of vulnerability to poverty. This is due to the fact that, the larger number of dependents in a household increase the burden on the active household members in meeting cost of minimum

basic need requirements (food and non-food), thereby it increases the chance of vulnerability to poverty of that household. This is similar with the finding of (Azam & Imai, 2009).

Asset Holding

As can be seen from table 4.18, the coefficients of oxen holding and current value of asset holdings are negatively and significantly associated with the household's vulnerability to poverty status. The households with a large number of oxen and having a large value of assets have a lower level of vulnerability to poverty as compared to the households with less number of oxen and less value of the current asset holding. The current value of the household asset holding measures the potential of the household to acquire the required inputs and to withstand economic shocks and income shortfalls to finance the household needs.

Off-farm income participation and access to different public services

The finding shows that, the coefficient of household involvement in own business activities, access to credit and access to agricultural extension services are negative and statistically significant at 5%, 1% and 10% significance levels respectively. Agricultural activities are highly vulnerable to the environmental shocks such as drought, flood, snow and hail storm and crop disease. Hence, one way to minimize household's vulnerability to poverty is the households' ability to get access to non-farm income opportunities. This study found that households with access to employment on own business activities are more secure and less vulnerable to poverty than households without income from own business. Households with access to credit are less vulnerable to poverty than households without access to credit. This is largely due to the fact that access to credit minimizes a household's financial constraint to acquire inputs and enables them to acquire more productive resources timely leading to diversification of income sources and hence lower level of vulnerability to poverty. This result is in conformity with the findings by Tsehay & Bauer (2012). Access to agricultural extension services reduces households' vulnerability to poverty implying the fact that extension services provide inputs and build up farmers' skills to use recommended amount of seed and fertilizer, to diversify their crops, which leads to minimize the effect of environmental shocks like crop diseases. Female-headed households become less vulnerable as compared to the male-headed households. This might be due the reasons that, in the study area female-headed households are mostly sharecropped out their land and received some amount of money before harvest. It may help them to have more or

less secure income although they sacrifice a certain amount of their farm income. However, it needs further study.

Village level characteristics

The variable, infrastructural index has entered in the regression analysis as a composite index of village level access to the following facilities: primary school, secondary school, access to clinic, access to hospital, access to pharmacy, veterinary services, public phone, electricity, grain mill, all weather roads and nurse site. The coefficient of the village level infrastructure index has a negative and significant effect on the household's vulnerability to poverty similar with the finding of (Novignon, 2010). The significance of the infrastructure index indicates that those households who have enough access to various infrastructural facilities tend to increase their welfare, hence reduced vulnerability to poverty. The coefficient of the remoteness to the main market and agroecological dummy are statistically significant at the 1 % significance level and having positive impacts on the household's vulnerability to poverty. The result of agroecological dummy and access to main market shows the similar pattern for poverty and vulnerability.

4.6. Shocks and its coping strategies

4.6. 1. The major shocks encountered in the study area

As can be seen from table 4.17, the major shocks that households in the study area encounter include drought, flood and soil erosion, pests and crop diseases, hailstorms, livestock diseases and pests and household shocks (illness and death). Around 86% of the surveyed households have reported drought shock followed by flood and soil erosion (62.8%) over the last five years. This implies that consistent with other findings (see for e.g. Temesgen, 2010; Decone, 2005) drought is the dominant form of shock in Ethiopia.

Table 4. 17 Major shocks encountered by the households in Gubalafto Woreda

Types of Shock	Number of households	Percentage of households
Drought shocks	215	86.00
Flood and soil erosion	157	62.80
Hail storms	112	44.80
Crop diseases and pests	137	54.80
Livestock diseases and pests	49	19.60
Death shocks	16	6.40
Illness shock	90	36.00

Source: Compute from own survey, 2013

The effects of major shocks on the surveyed households

As can be seen from table 4.19, households' asset holding, income and their consumption are adversely affected by the environmental shocks (such as drought, flood and soil erosion, pest and crop diseases, pest and disease, which affects the livestock), death and illness shocks.

Around 83.2%, 47.6% and 69.2% of respondents were reporting that their farm income, productive asset holding and the household consumption decrease because of drought shock in the study area respectively. Household's productive asset holding decrease by an adverse effect of the most commonly repeated shocks either directly or indirectly. Some shocks like livestock disease and drought directly killing the livestocks in one way and it also forced the households to sell their livestock and other productive asset to subsidize their consumption short falls in the other way.

Hailstorm, pests and crop diseases directly reduced crop and non-crop farm income and subsequently it reinforced the households to reduce their livestock and other productive asset holding which affects their future income generating ability. In general, the impact of a particular shock is not limited to the household's asset holding, income or consumption. For example, drought shock affects household consumption through its effect on income and subsequently it affects the household's productive asset holding.

Table 4. 18 The effect of shocks on the surveyed households

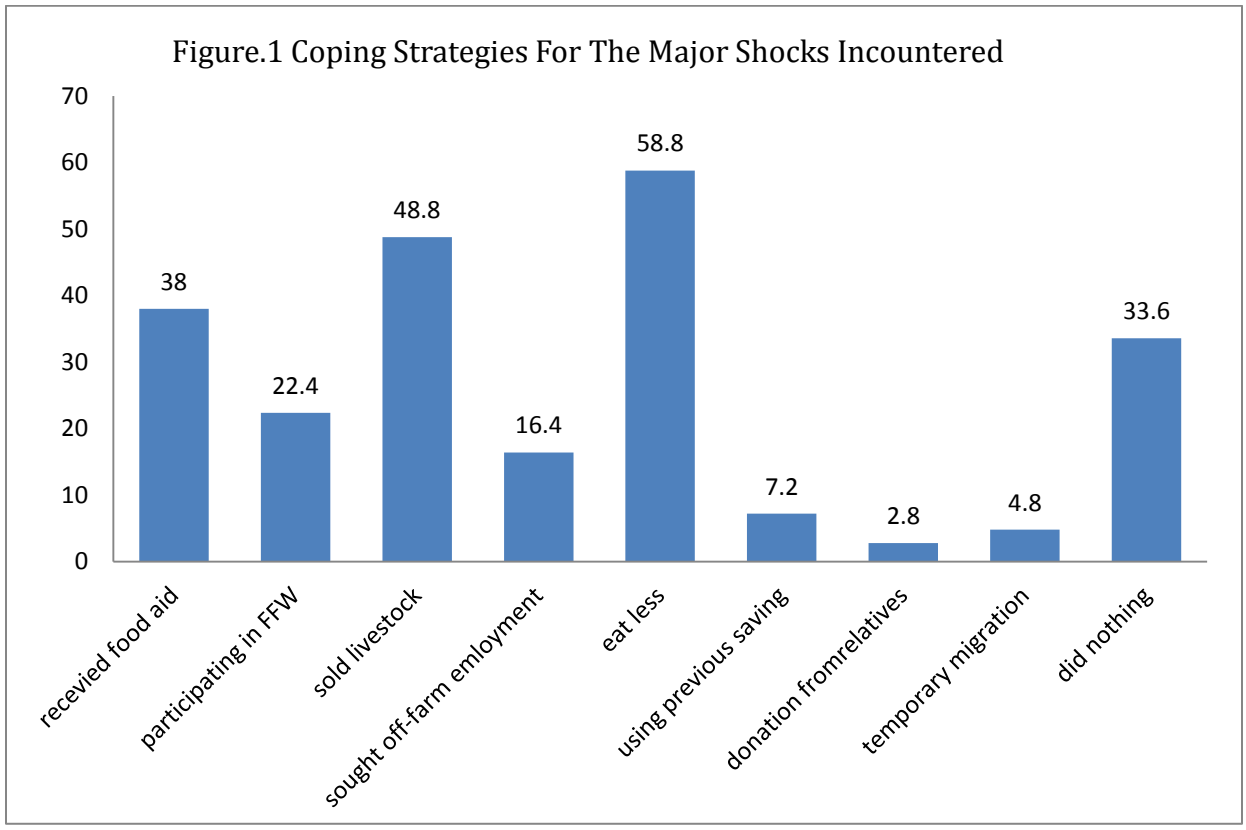
Types of shocks	Effect of shocks on surveyed households	Number farmers	Percentage
Drought shocks	1. Loss of productive assets	119	47.60
	2. Loss of household income	208	83.20
	3. Reduction in household consumption	173	69.20
Flood and soil erosion	1. Loss of productive assets	57	22.80
	2. Loss of household income	152	60.80
	3. Reduction in household consumption	125	50.00
Hailstorms	1. Loss of productive assets	50	20.00
	2. Loss of household income	152	60.80
	3. Reduction in household consumption	125	50.00
Crop disease and pest sides	1. Loss of productive assets	63	25.20
	2. Loss of household income	131	52.40
	3. Reduction in household consumption	120	48.00
Livestock shocks	1. Loss of productive assets	35	14.00
	2. Loss of household income	46	18.40
	3. Reduction in household consumption	39	15.60
Illness shocks	1. Loss of productive assets	69	27.60
	2. Loss of household income	86	34.40
	3. Reduction in household consumption	57	22.80

Source: Compute from own survey, 2013

4.6.2 Coping mechanisms

People in a vulnerable area engaged in several activities in order to avoid or minimize their consumption short falls. Households were asked about the mechanism they use to cope with consumption shortfalls. Figure 1 below summarizes the result. Reduction of consumption in terms of both the number of meals per day and amount of food per meal was identified as a means of coping mechanism for the largest proportion (58.8%) of the respondents. The second frequently used strategy reported by 48.8% of the respondents (households) was sale of

livestock. It means that, in addition to serving as a source of power for farming and manure for fertilizing soil, Livestock can serve as an insurance against shocks. Emergency relief in the form of food aid from government and NGOs reported by 38% of the households stands as the third frequently used coping mechanism.



Source: Compute from own survey, 2013

4.7 Inequality

Inequality is a broader concept than poverty in that it is generally defined over the whole population, but not just for the population who are below a certain threshold (World Bank 2005). The simplest way to measure inequality among individual households is by dividing the population into a certain quintile group from poorest to richest, and taking the levels or proportions of income (or expenditure) that accrue to each quintile group. In this study, the entire population is divided into five-quintile group. Accordingly, the following table shows that around 9.64% of all expenditures were made by the poorest fifth of the households (first quintile group). It implies that the poorest 20% of the household consumes only 9.64% of the average

consumption expenditure per month. However, the share of monthly consumption expenditure per adult equivalent of the richest 20% of the households in the study area accounts for 36.4%. Table 4.25 shows that the mean consumption expenditure of the poorest 40% of the households is still smaller than the share of the top quintile.

Table 4. 19 Mean consumption expenditure in each quintile group

Consumption expenditure by Quintile group	N	Mean	SD	Percentage
First quintile	50	209.82	36.63	9.64
Second quintile	50	292.63	21.20	13.44
Third quintile	50	380.86	34.06	17.50
Forth quintile	50	501.12	36.26	23.02
Fifth quintile	50	792.43	206.43	36.40
Total	250	2176.87	224.94	100.00

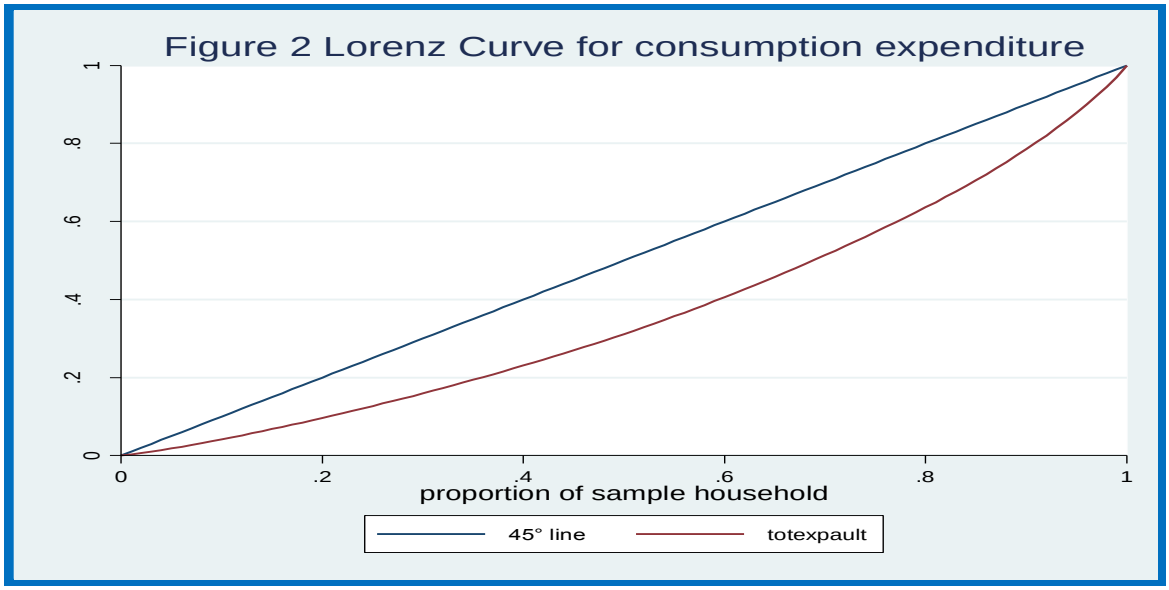
Source: Compute from own survey, 2013

Summery measures of inequality

The most widely used single summarized measures of inequality is the Gini coefficient. It is based on the Lorenz curve, which is a cumulative frequency curve that compares the distribution of a specific variable (e.g. Consumption expenditure) with the uniform distribution that represents equality.

Therefore, this study used Gini Coefficient of inequality to measure the income distribution of the study area. The Gini coefficient ranges from zero to one, where a zero coefficient implies perfect equality and a value of 1 implies perfect inequality or full disparity in expenditure distribution. The Lorenz curve is plotted on the x-axis and y-axis. The cumulative proportion of sample household is plotted on the x-axis and cumulative proportion of variable consumption expenditure in the y-axis. Inequality is greater the farther the Lorenz curve bends away from 45^0 line. Thus as the diagonal moves far away from the 45^0 straight line on the curve which is line of perfect equality, expenditure inequality would increase and the vise versa. In the study area, the Lorenz curve and Gini coefficient were plotted and computed using Stata Direct software.

As can be seen from figure 4.26, consumption expenditure did not evenly distributed among the sampled households in the study area. The following graph indicates the proportion of the expenditure going to the different quintile groups (poorest, middle-income and richest people). As a measure of inequality, the Gini-coefficient varies with the range between 0, which reflects complete equality (all people share consumption or income equally and 1, which indicates complete inequality (one person has all the income or consumption, all others have none). The Gini-coefficient for the study area estimated using the DASP distributive analysis, and it accounts 0.27. Gini coefficient more than 0.5 is indicates a worrisome level of inequality. Accordingly, even if the consumption expenditure inequality in the study area is too large, it is tolerable as compared to the usual benchmark (0.5).



Source: Compute from own survey, 2013

CHAPTER FIVE

CONCLUSION AND POLICY RECOMMENDATION

5.1. Conclusion

This study was set out to examine the extent of poverty and vulnerability to poverty depending on the sample of 250 rural households drawn from three-agroecological zone in the Gubalafto woreda. Moreover, the determinants of household's welfare, poverty gap and poverty severity as well as determinants of vulnerability to poverty were identified. Based on the evidences that were obtained from the study the following conclusion could be drawn:

Although, various food security programs such as safety net program, rural household's agricultural extension services and credit access were implemented widely, the problems of poverty is spreading widely in the rural households in general in the Gubalafto Woreda in particular. Accordingly, among the 250 sample households in the study area 30% of the households were found to be poor implies that they could not get the minimum and above recommended calorie level of 2200 kcal per adult per day.

The basic asset holding of the rural household in the Gubalafto Woreda particularly land size and number of oxen were found to be an extremely low. The average number of oxen and land size per households were less than one ox and around 0.5 hectare[2] of land respectively. Poverty in the study area deeply correlated with household characteristics and asset holding. Poverty decomposition result shows that, large family size shrinking the economic resource and dipping the income generating capacity of the households and resulting households with large family size had significantly higher level of poverty. Similarly, the size of adult labour in the household seems not to have generally contributed to improved welfare of households. The households with adult labor greater than or equal to the woreda mean had higher poverty indexs. It might be due to the underlining negative marginal returns to labour and the poor functioning of labour markets in the study area.

On the other hand, increasing the household asset holding such as ox, livestock, and farm and household assets, and access to irrigation and employment on own businesses were considered to

[2] One timad of land equivalent to 0.25 hectare of land

be the main tools to enhance the household's welfare and mitigating the incidence and severity of poverty in the study area. Moreover, human capital plays a significant role in the poverty alleviation. Household head with at least primary school complete has a lower level of poverty incidence and intensities of poverty.

Gubalafto woreda is a drought prone area and households frequently affected by drought and other environmental shocks such as flood, hailstorms, animal diseases, and pest and crop diseases. It leads to that around 43% of rural households were faces food shortage and depends on the emergency relief food aid, and currently non-poor people might be poor in a period ahead. The study found that on average there is .37 probability of entering into poverty a period ahead. This estimated result showed sizable fractions of the households in the study area are observed to be non-poor are estimated to be vulnerable to poverty. Therefore, the headcount poverty rate is considerably different from the headcount vulnerability rate in the study area.

The study employed ordinary multiple regression model to identify the determinants of the households' welfare and correlates of vulnerability to poverty. In addition, the Tobit model used to identify the determinants of poverty gap and intensity in the Gubalafto woreda. In the analysis of the determinants of poverty, a household with large family size seem to have low level of welfare. Similarly, households in remote areas and those highly dependent on wage employment have low level of welfare. On the other hand, asset holding such as oxen, land ownership, farm as well as household assets holding, own business activities, access to rural credit significantly enhance welfare of households and hence reduce the probability to fall into poverty.

The Tobit regression result on determinants of both poverty gap and poverty severity indicated that, large family size, employment on wage activities, distance to the main market and kolla agroecological location were significantly and positively increasing the household's probability of falling into poverty gap and square poverty gap. Building the rural household asset ownership like oxen, farm as well as household asset, and land holding significantly reduced the poverty gap and poverty severity. In the same fashion, enhancing the self- employment activities, rural public services such as credit access and agricultural extension services were significantly reduced both the poverty gap and poverty severity, and the probability of falling into the poverty trap.

There is also a strong correlation between the factors influencing poverty and vulnerability to poverty. However, to some extent, there are a few factors significantly associated with vulnerability only but not poverty and vice versa suggesting that identifying such factors are highly essential to dipping vulnerability and poverty at the same time in the study area. The vulnerability of the households are positively and significantly correlated to household characteristics such as male-headed household, age square, the number of children and dependency ratio.

On the other hand, age of household head, human capital (proxied by head education), physical asset holding such as oxen and value of farm and household asset holding, employment on own business, access to public services are a key to reducing vulnerability to poverty. Similarly, village level infrastructural development has significantly positive contribution on the economic development and reduction of rural household's vulnerability to poverty. Finally, vulnerability to poverty differs significantly across households by agroecologocal location and the households live in the remote area are highly vulnerable to poverty.

5.2. Recommendation

- Household characteristics such as family size and dependency ratio were identified as the major determinants of the household's consumption expenditure, poverty gap and square poverty gap in the study area. Large family size significantly dipping the welfare of the households, and the households with a large number of family sizes had a significantly higher probability of falling into the poverty gap as well as the intensity of poverty. Therefore, serious attention has to be given to limit the increasing population in the study area. Expanding the effective extension services to increase awareness among rural households (both men & women) in using family planning to reduce fertility is required with considering the replacement and the mortality rate in the rural households of Gubalafto woreda. On the other hand, dependency ratio has a significant and positive correlation with the welfare of the households. This implies that households with a large number of dependents relative to the number of adult households were in a better position. This is implicitly indicated that, the size of adult labor in the household seems not to have a positive contribution or improvement of the welfare of the households due to underling negative marginal returns to the adult labor and poor function of labor market in the study area. Thus, this calls for policy measures that attack poverty and its intensity through increasing investments in employment creation and productivity enhancement to mobilize the idle labor resource as well as to increases the labor productivity.
- Asset holding such as oxen, land size as well as farm and household asset significantly improved the household's welfare and reducing the probability of falling into poverty gap and poverty intensity. Factors like number of ox per adult and current value of asset holding (both farm & household asset) found negatively correlated with the household's vulnerability to poverty. Therefore, this is an insight that rural household asset bulling program should be implemented to enhance households welfare and reduces poverty and vulnerability to poverty. Whereas, in case of limited farm size, tackling the problem of poverty through increasing farm size would not bring any sustainable development. As a result, strong efforts should be made to improve the production and farm income through providing agricultural credit services and agricultural extension services in the study area.

- Off –farm income involvement particularly in own business activities significantly improved households welfare and negatively associated with poverty and vulnerability to poverty. However, there are a limited number of households involved in this type of activities in the study area. Infrastructural facilities especially the transportation system is not well developed and particularly the households in the Dega agroecological zone supposed to traveled more than 41Kms to access transportation services. Therefore, policy measures required for creating and expanding the self-employment opportunities accompanied with strengthening the transportation facilities.
- In addition, public services such as access to credit and agricultural extension services significantly affect household's welfare, poverty intensity and vulnerability to poverty with the expected signs. Therefore, expanding rural credits and agricultural extension services to subsistence farmers in the study area should be one of the main areas of intervention and policy options.
- Finally, the regression results also revealed the importance of village level factors. Households far from the main market have a lower level of welfare status and they have a higher level of poverty intensity. Households in the remote areas are also highly vulnerable to poverty. This calls the policy measures to address inadequate market access through investments in marketing infrastructures, such as market stalls, rural access roads, transportation facilities and agricultural price information systems. Moreover, the private sector and NGO's should be encouraged to invest in agricultural input and output market infrastructural facilities. The coefficient of the village level infrastructural facility has a significant and negative effect on the household vulnerability to poverty. Village level infrastructural facilities contributed to the households to have a diversified and a stable source of income, and hence it reduced the household's vulnerability to poverty. This calls the policy measures to alleviate the rural household vulnerability to poverty through investment in the infrastructural facilities.

Rooms for further research

Even if this paper attempted to analyze the extents of poverty and vulnerability as well as the determinants of poverty and vulnerability to poverty at household level, several issues left out to the further studies:

First, the study confined its scope to the rural households of Gubalafto Woreda, which is one of the drought prone area in the Amhara region. However, the incidence of poverty particularly food poverty persistently increases in Amhara region since the 1999/00. Therefore, regional level poverty and vulnerability studies also required to assesses the extents of poverty and vulnerability to poverty, and its determinants.

Second, this study mainly focused on the unidimensional poverty analysis (income poverty). Nevertheless, poverty is a multidimensional phenomenon. A host of deprivations can reflect the household or individuals' poverty. Multidimensional poverty includes deprivations along dimensions other than money, mainly social deprivation or marginalization like inability to participate in the community issues. This calls now researchers to analyze multidimensional poverty and come up with the complete picture of the rural households.

Third, in this study household's welfare, poverty and vulnerability to poverty assessed using the data obtained from the households at a point in time. However, the analysis of poverty dynamics using panel data distinguished between the transient and chronic poverty or the exit, entry and re-entry in to poverty. It increases the reliability and representativeness of the results. Thus, further studies also required on the rural household's poverty and vulnerability to poverty using longitudinal data.

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APPENDICES

Appendex 1: Calorie Based Nutrition Adult Equivalence Scales

Years of age	Male	Female
0-1	0.33	0.33
1-2	0.46	0.46
2-3	0.54	0.54
3-5	0.62	0.62
5-7	0.74	0.70
7-10	0.84	0.72
10-12	0.88	0.78
12-14	0.96	0.84
14-16	1.06	0.86
16-18	1.14	0.86
18-30	1.04	0.80
30-60	1.00	0.82
60+	0.84	0.74

Source: Adopted from Dercon and Krishnan (1998).

Appendex 2: Energy content per 100 gm of edible portion of food items

Food items	K.calori value	Food items	K.calori value
teff	341	garlic	149
barley	354	sugar	400
wheat	351	coffee	2
maize	362	potato	87
surgom	347	tomato	70
lentil	370	cabbages	25
bean	344	millik	39
chickpea	341	beef	235
guya	347	chicken	140
beribere	318	eggs	68
Idabel oil	884	salt	0
onion	42		

Source: adopted from Fredu (2008)

Appendix 3: Conversion factors that used to estimate tropical livestock unit (TLU) equivalents

Animal Category	TLU	Animal Category	TLU
Cow & Ox	1.00	Donkey (adult)	0.70
Horse & mule	1.10	Donkey (young)	0.35
Camel	1.25	Sheep and Goat (adult)	0.13
Heifer & bull	0.75	Sheep and Goat (young)	0.06
Calf	0.25	Chicken	0.013

Source: Adopted from Yilma (2005).

Appendex 4: computation of food poverty line at current market price

Food items	Mean .Con. per adult per month/kg of food items(A)	Caloric value of each food(B)	Calorie requirement per adult.equv. Per month(C=A*B*10)	Scale up & down (A) $D = \left[\frac{66000}{56210.9}\right] * A$	Median price	Food poverty line per month(Birr)
teff	2.35	341	8013.50	2.72	15.10	41.05
barley	3.54	354	12531.60	4.10	7.65	31.34
wheat	1.49	351	5229.90	1.72	8.46	14.58
maize	0.05	362	181.00	0.06	8.70	0.50
surgom	4.41	347	15302.70	5.10	10.41	53.10
lentil	0.47	370	1739.00	0.54	13.70	7.45
bean	1.03	344	3543.20	1.19	8.98	10.70
chickpea	0.76	341	2591.60	0.88	10.00	8.79
guya	0.86	347	2984.20	0.99	7.43	7.40
beribere	0.22	318	699.60	0.25	44.44	11.31
Idabel oil	0.25	884	2210.00	0.29	25.00	7.23
onion	0.37	42	155.40	0.43	5.00	2.14
garlic	0.07	149	104.30	0.08	19.00	1.54
sugar	0.19	400	760.00	0.22	15.00	3.30
coffee	0.12	2	2.40	0.14	83.33	11.57
potato	0.47	87	408.90	0.54	5.00	2.72
tomato	0.17	70	119.00	0.20	6.00	1.18
cabbages	0.41	25	102.50	0.47	5.00	2.37
millik	0.14	39	54.60	0.16	7.00	1.13
beef	0.08	235	188.00	0.09	70.00	6.48
chicken	0.06	140	90.98	0.08	50.00	3.76
eggs	0.06	68	40.80	0.07	15.00	1.04
salt	0.62	0	0.00	0.72	4.36	3.13
Total			**57053.18**	**21.05**		**233.81**

Source: Compute from own survey, 2013

Appendex 5: village level infrastructural index

A. Dummy variable equal to one if the household in village with access to primary school, 0 otherwise.
B. Dummy variable equal to one if the household in village with access to secondary school, 0 otherwise.
C. Dummy variable equal to one if the household in village with access to clinic, 0 otherwise.
D. Dummy variable equal to one if the household in village with access to livestock market, 0 otherwise.
E. Dummy variable equal to one if the household in village with access to nursery site, 0 otherwise.
F. Dummy variable equal to one if the household in village with access to pharmacy, 0 otherwise.
G. Dummy variable equal to one if the household in village with access to Veterinary service center, 0 otherwise.
H. Dummy variable equal to one if the household in village with access to public telephone, 0 otherwise.
I. Dummy variable equal to one if the household in village with access to electricity, 0 otherwise.
J. Dummy variable equal to one if the household in village with access to grain mill, 0 otherwise.
K. Dummy variable equal to one if the household in village with access to paved/ all weather roads, 0 otherwise.
L. Dummy variable equal to one if the household in village with access to rented truck, 0 otherwise.
M. Dummy variable equal to one if the household in village with access to public transports, 0 otherwise.

Village level infrastructural index= $\left[\frac{a+b+c+d+e+f+g+h+i+j+k+l+m}{13}\right]$

Appendex 6: OLS regression result on consumption expenditure per adult equivalent

```
. reg lantotexpadul sexhh agehh   age2 avafamage  famsize   depratio  nchildern headedu8 oxendult tluadult landsiadu  totassetval
> emplobuspar emplowag1 irrigacc credacce  accexte   inputuse accaid1  villaifindx dismar  drougtsh  deathsho dega kolla, robust

Linear regression                               Number of obs =     250
                                                F( 25,   224) =   11.81
                                                Prob > F      =  0.0000
                                                R-squared     =  0.5056
                                                Root MSE      =  .35205
```

lantotexpa~l	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
sexhh	.0649154	.0667626	0.97	0.332	-.0666478	.1964786
agehh	.0046303	.0114819	0.40	0.687	-.017996	.0272566
age2	-.0000744	.00011	-0.68	0.499	-.0002912	.0001423
avafamage	.0022043	.001891	1.17	0.245	-.0015222	.0059307
famsize	-.0855539	.0238585	-3.59	0.000	-.1325697	-.0385381
depratio	.0991173	.0498651	1.99	0.048	.0008526	.1973819
nchildern	-.0477343	.0360761	-1.32	0.187	-.1188263	.0233578
headedu8	.0985856	.1143018	0.86	0.389	-.1266588	.3238299
oxendult	.352436	.1155275	3.05	0.003	.1247762	.5800957
tluadult	.0969362	.0642219	1.51	0.133	-.0296202	.2234927
landsiadu	.3738702	.0770043	4.86	0.000	.2221247	.5256158
totassetval	.0000297	6.26e-06	4.74	0.000	.0000174	.000042
emplobuspar	.1491604	.0713091	2.09	0.038	.0086378	.2896829
emplowag1	-.1497387	.0604134	-2.48	0.014	-.2687901	-.0306873
irrigacc	.0426186	.0664352	0.64	0.522	-.0882994	.1735366
credacce	.0993335	.0574514	1.73	0.085	-.0138809	.2125479
accexte	.1661227	.1300336	1.28	0.203	-.090123	.4223684
inputuse	-.0463888	.0822211	-0.56	0.573	-.2084146	.115637
accaid1	-.0688629	.0513526	-1.34	0.181	-.1700589	.0323332
villaifindx	.1148583	.1196079	0.96	0.338	-.1208423	.3505589
dismar	-.0006345	.0002246	-2.83	0.005	-.0010771	-.0001919
drougtsh	-.0724278	.0719878	-1.01	0.315	-.2142877	.069432
deathsho	.033425	.0760446	0.44	0.661	-.1164294	.1832794
dega	-.0229462	.1115157	-0.21	0.837	-.2427003	.1968078
kolla	-.1745229	.0922203	-1.89	0.060	-.3562533	.0072075
_cons	5.802476	.3116257	18.62	0.000	5.188383	6.416569

Appendix 7: Tobit regression result on determinants of poverty gap

```
. tobit avtio1 sexhh agehh  age2   avafamage  famsize  depratio  nchildern headedu8  oxendult tluadult landsiadu  totassetval  em
> plobuspar emplowag1 irrigacc credacce  accexte  inputuse accaid1  villaifindx dismar  drougtsh  livedeasho  dega kolla , ll(0)ro
> bust

Tobit regression                                Number of obs   =        250
                                                F(  25,   225) =       5.19
                                                Prob > F        =     0.0000
Log pseudolikelihood = -139.07952               Pseudo R2       =     0.3369
```

avtio1	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
sexhh	.1050327	.1802914	0.58	0.561	-.2502429	.4603083
agehh	.0148192	.0393302	0.38	0.707	-.0626835	.0923219
age2	.0000302	.0003822	0.08	0.937	-.0007229	.0007833
avafamage	-.0173659	.0089875	-1.93	0.055	-.0350763	.0003444
famsize	.1379053	.0666452	2.07	0.040	.0065768	.2692338
depratio	-.1740933	.1469168	-1.18	0.237	-.4636021	.1154155
nchildern	.1409532	.1041122	1.35	0.177	-.0642065	.346113
headedu8	.3711889	.3437832	1.08	0.281	-.3062576	1.048635
oxendult	-1.623899	.4835214	-3.36	0.001	-2.576708	-.6710893
tluadult	-.3526763	.2724736	-1.29	0.197	-.8896028	.1842503
landsiadu	-1.29472	.3076196	-4.21	0.000	-1.900904	-.6885356
totassetval	-.0003073	.0000674	-4.56	0.000	-.0004401	-.0001745
emplobuspar	-.4507466	.2469554	-1.83	0.069	-.9373879	.0358948
emplowag1	.4496837	.1712199	2.63	0.009	.112284	.7870834
irrigacc	-.0491156	.1833027	-0.27	0.789	-.4103253	.3120941
credacce	-.4021515	.1581612	-2.54	0.012	-.7138183	-.0904848
accexte	-.5588877	.2435099	-2.30	0.023	-1.038739	-.0790359
inputuse	.2142034	.2043809	1.05	0.296	-.1885422	.6169489
accaid1	.0460514	.1551505	0.30	0.767	-.2596824	.3517852
villaifindx	-.5544379	.3806541	-1.46	0.147	-1.304541	.1956651
dismar	.001539	.0007924	1.94	0.053	-.0000223	.0031004
drougtsh	-.0089101	.1705637	-0.05	0.958	-.3450167	.3271965
livedeasho	.1855534	.1796486	1.03	0.303	-.1684556	.5395624
dega	.2671969	.3357986	0.80	0.427	-.3945155	.9289093
kolla	.766519	.2716762	2.82	0.005	.2311639	1.301874
_cons	.1342541	1.122086	0.12	0.905	-2.076888	2.345396
/sigma	.7649317	.0604669			.6457777	.8840856

```
  Obs. summary:        174  left-censored observations at avtio1<=0
                        76     uncensored observations
                         0 right-censored observations
```

Appendix 8: Tobit regression result on determinants of poverty severity

```
. tobit tio22 sexhh agehh  age2  avafamage  famsize  depratio  nchildern headedu8  oxendult tluadult landsiadu  totassetval  empl
> obuspar emplowag1 irrigacc credacce  accexte  inputuse accaid1  villaifindx dismar  drougtsh  livedeasho  dega kolla , ll(0)robu
> st

Tobit regression                                Number of obs   =        250
                                                F(  25,    225) =       3.08
                                                Prob > F        =     0.0000
Log pseudolikelihood = -170.64012               Pseudo R2       =     0.2843
```

tio22	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
sexhh	.1837055	.2909631	0.63	0.528	-.3896557	.7570668
agehh	.028337	.0632055	0.45	0.654	-.0962135	.1528876
age2	-.000015	.0006046	-0.02	0.980	-.0012063	.0011764
avafamage	-.0275232	.0146687	-1.88	0.062	-.0564287	.0013823
famsize	.2117189	.1210924	1.75	0.082	-.0269014	.4503392
depratio	-.282163	.2532641	-1.11	0.266	-.7812361	.21691
nchildern	.2007097	.1695334	1.18	0.238	-.1333665	.5347859
headedu8	.3655966	.5928871	0.62	0.538	-.8027251	1.533918
oxendult	-2.324828	.8157242	-2.85	0.005	-3.932265	-.7173922
tluadult	-.5548695	.4419389	-1.26	0.211	-1.425738	.3159991
landsiadu	-2.18842	.5483258	-3.99	0.000	-3.268931	-1.107909
totassetval	-.0005037	.0001124	-4.48	0.000	-.0007253	-.0002822
emplobuspar	-.7619013	.3891249	-1.96	0.051	-1.528697	.0048941
emplowag1	.8255769	.2931372	2.82	0.005	.2479315	1.403222
irrigacc	.0736808	.324141	0.23	0.820	-.5650596	.7124212
credacce	-.6483961	.2668832	-2.43	0.016	-1.174306	-.1224858
accexte	-1.258181	.5328057	-2.36	0.019	-2.308108	-.2082538
inputuse	.0517468	.3847616	0.13	0.893	-.7064502	.8099439
accaid1	.0822981	.2404471	0.34	0.732	-.3915181	.5561143
villaifindx	-.9046427	.5955223	-1.52	0.130	-2.078157	.2688717
dismar	.0025898	.0013032	1.99	0.048	.0000218	.0051578
drougtsh	.0657297	.2662858	0.25	0.805	-.4590034	.5904628
livedeasho	.2314642	.2781385	0.83	0.406	-.3166255	.7795538
dega	.17682	.5898423	0.30	0.765	-.9855017	1.339142
kolla	1.038297	.4462962	2.33	0.021	.1588417	1.917752
_cons	.4517517	1.866715	0.24	0.809	-3.226729	4.130232
/sigma	1.24978	.1251619			1.003141	1.496419

```
  Obs. summary:        174  left-censored observations at tio22<=0
                        76     uncensored observations
                         0 right-censored observations
```

Appendex 9: OLS regression result on determinants of vulnerability to poverty

```
. reg v03 sexhh agehh  age2  avafamage   famsize    Juniors nchildern depratio headedu8   oxendult tluadult landsiadu  totassetval
>  emplobuspar emplowag1 irrigacc credacce  accexte inputuse   villaifindx dismar   drougtsh livedeasho dega kolla, robust

Linear regression                               Number of obs =     248
                                                F( 25,   222) =   62.96
                                                Prob > F      =  0.0000
                                                R-squared     =  0.8567
                                                Root MSE      =  .10718

------------------------------------------------------------------------------
             |               Robust
         v03 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       sexhh |   .0705319   .0313898     2.25   0.026     .0086719    .132392
       agehh |  -.0470915   .0046678   -10.09   0.000    -.0562903   -.0378927
        age2 |   .0004288   .0000451     9.52   0.000       .00034    .0005176
   avafamage |   -.003508   .0016557    -2.12   0.035    -.0067709    -.000245
     famsize |   .0143565   .0107571     1.33   0.183    -.0068426    .0355556
     Juniors |    .035534   .0262136     1.36   0.177    -.0161254    .0871933
   nchildern |   .0859176   .0301389     2.85   0.005     .0265226    .1453127
    depratio |   .1369773   .0590291     2.32   0.021     .0206483    .2533064
    headedu8 |  -.0269392   .0206736    -1.30   0.194    -.0676809    .0138024
    oxendult |  -.1228444    .032736    -3.75   0.000    -.1873575   -.0583313
    tluadult |    .021138   .018061     1.17   0.243    -.0144548    .0567309
   landsiadu |   .0396446   .0276659     1.43   0.153    -.0148768     .094166
  totassetval |  -.0000132   2.67e-06    -4.95   0.000    -.0000185   -7.95e-06
  emplobuspar |  -.0512522    .019302    -2.66   0.008    -.0892907   -.0132137
    emplowag1 |   .0174413   .0148917     1.17   0.243    -.0119058    .0467884
     irrigacc |    .015445   .0183463     0.84   0.401    -.0207101    .0516002
     credacce |  -.0755785   .0179927    -4.20   0.000    -.1110368   -.0401202
      accexte |  -.0488398   .0250769    -1.95   0.053     -.098259    .0005795
     inputuse |  -.0130328    .027278    -0.48   0.633    -.0667898    .0407242
   villaifindx |  -.1096122   .0412729    -2.66   0.008    -.1909491   -.0282753
       dismar |   .0002718   .0000842     3.23   0.001     .0001059    .0004378
     drougtsh |  -.0015071   .0207074    -0.07   0.942    -.0423152    .0393011
   livedeasho |   .0021414   .0133092     0.16   0.872    -.0240872    .0283699
         dega |   .0332398   .0373012     0.89   0.374      -.04027    .1067496
        kolla |   .0901823   .0269525     3.35   0.001     .0370669    .1432978
        _cons |   1.412489   .1284955    10.99   0.000     1.159262    1.665716
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Appendix 10: Survey instrument

Questionnaire

Poverty and vulnerability analysis on the rural household's; a case of Gubalafto Woreda, Amhara region

Good morning /afternoon. My name is _____. We are doing a research to develop an academic study about the analysis of poverty and vulnerability. I would like to account on your cooperation to understand your poverty and vulnerability status through examining your asset, consumption and human capital, etc.

Woreda: _____

Kebele: _____

Kebele distance from woreda center (town)_____

Kebele distance from asphalt road_____from gravel roads_____

Interviewer: _____

Date of interview: _____

Checked by: _____

Date checked: _____

Comments by supervisor: _____

Data entry by: _____

Household ID code: _____

Part I - Basic household information

Code (A) 1=head 2=wife/husband 3=Son/Daughter 4=Mother/Father 5=Brother/Sister 6=Son/daughter -in –law 7=Niece/Nephew 8=Uncle/Aunt 9= servants 10= brother/sister-in-law 11=step-son/daughter 12=grandparent 13= grandchild	14=other relative of the head or of his/her spouse 15= father/mother-in-law 16=Tenant/boarder 17=others____ **Code (B)** Male =1, Female =2 **Code(D)** Yes =1**,** No =2 **Code (C)** 1-12 grade level for formal schooling 13=TVET /college diploma 14=university 1st degree and above 15= never read and write	17=read and write without formal education. 18= traditional (religious) education. 19=too young to attained (child) 20= others **Code (E)** 0=single(never married), 1=married, 2=widowed, 3=divorced, 4=separated, 5= too young to Mary, 6= others (specify)	**Code (F)** 1=Orthodox, 2=Muslim 3=Protestant, 4=Catholic 5=Others (Specify)____ **Code (G) main activity:** 1= farming , 2= pensioner, 3=petty trading, 4=civil servant, 5=student 6= public sector enterprise employee, 7= private enterprise employee, 8= producer/ service cooperative employee, 9= causal /temporary worker, 10= domestic worker (yebet agligay) 11=others_____

1. We would like to ask a few questions about all members of the household (beteseb). Please include everybody who usually lives in the household (included servants)

ID. code	Name of the household members	Relationship to the household head (A)	Sex (B)	Age	Educational level completed (C)	Skill (special skills) (D)	Marital Status (E)	Religion (F)	Major activities (G)	Secondary Activities (G)
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Part 2: Household land ownership

Here, the interviewer would like to ask about the land Owen by a household member, attention should be given to that, do not include land sharecropped in or rented in from other households.

Code (A) 1=redistribution,2= transfer from family/relative, 3=through disputes, 4= leased , 5=others (specify)_____
Code (B) 1=Owned cultivate, 2= Owned but cultivated by other (sharecropped out), 3= Owned but (rented out), 4=grazing land , 5=fallow land, 6=Forestland, others specify_____

Plot No.	1)Plot size in tsimad	2) When did you get this land? Year	3) What was the Source of this land? (A)	4)Use of the plot in last main season (kiremt) in tsimad (B)
1				
2				
3				
4				
5				
6				
7				
8				

Part 3: crop output and sales -kiremt

1. Here, the interviewer would like to ask about each crop harvested during the last season (kiremt)
2. For the permanent crops, mention the harvest during the period since the begging of meskerm, 2005?

Plot No.	Plot size in tsimad	Crop type grown in the last kiremt) (A)	Owen land=1, rented in=2 Sharecropped out=3 Share cropped in)=4	How much was your harvest from last season's crop? (kiremt)			Have you given any part of the harvest to others as payment for Kiray/rent and/or gift?			Have you sale any amount of last season harvest?	If you sale any part of your harvest, give details		
				quantity	**Unit (B)**	**Value**	**quantity**	**Unit (B)**	**value**	Yes=1, no=2	**Quantity**	**Unit (B)**	**Total revenue(birr)**
1													
2													
3													
4													
5													
6													
7													

Code (A)

1. Barley 2. Wheat 3. Maize 4. Sorghum 5. Oats 6.	7. Zengada (lequa) 8. White teff 9. Black and mixed teff 10. Sesame 11. Lentils	12. Beans 13. Linseed 14. Groundnut 15. Vegetables 16. Potatoes 17. onion	18. Coffee 19. Chat 20. Bananas 21. Geshu 22. Eucalyptus 23. Onion	24. Ananas (pineappl), 25. Guya, other 26. Sugar ca 27. chick peas, 28. .Cow peas	29. Papaya, 35.guaya, 36. 30. Avocado 31. Orange 32. Lemon 33. Guaya (zeytuna) Other (specify)_____

Code (B)

1=kilogram, 2=quintal, 3=kuna, 4=tassa, 5=akimada
6= kesha/madaberiya, 7=ensira
9=esire, 10=chinet, 11=jambo
Others(speify)_____

1. Did you rented out your land in the last main production season (kiremt)? Yes=one, No=2, if yes, what amount of money you received? _____birr
2. If you cultivated through rented –in, how much money /land rents did you paid in the last season (kiremt)? _____Birr
3. Have you sharecropped out your land in the last main production season (kiremt)? Yes=1, No=2, if yes, how much income you get from sharecropped out?_____birr
4. Have you any amount of stored cereal at least for a year? Yes=1, No=2

Part 4: Irrigation access & crop output from irrigation and belg-season

1. Are there any irrigation projects or irrigable water sources (river diversion) in your community? Yes =, No=2, if no go to Q7for belg harvest.
2. If yes do you or your household member has irrigable land? Yes= 1, No=2
3. If you say yes in Q2, what is the size of irrigable land in tsimad? _____
4. How many times do you produce per year using irrigation? _____
5. Where the irrigable water source available (accessible)? Highland=1 (upper stream), middle land (middle stream) =2, lowland (lower stream) =3
6. If your answer in Q2 is no, what are the main reasons? Lack of water source_____Lack of capital_____Lack of interests_____Lack of technical skill_____Steeply slope of plots_____Others (specify) _____

Input use in the last main production season (kiremt)

- The questions refer to all the land on which crops were harvested during the last Kiremt. The input questions refer to all crops as a whole.

Activity	Were any members of other households involved in the activity as part of a traditional labour sharing agreement?				If no labour sharing or apart from working with the work group, were any members of your Household involved in...[Name]...?		Did you hire in any labour & rented in oxen from outside the household to work on your land during the last Kiremt?				How much did you spend on traditional labor sharing activity?
	Total Number of owen hh member labor days	Total number of owen oxen days	Total number of other hh members labor - days	Total number of oxen days from others hh.	Total number of labor days	Total number of oxen days	Total number of labor days	Total payment included in –kind payments	Total number of oxen days	Total payments Included in-kind payments	
Ploughing											
Weeding											
Harvesting											

1. Did you use any manure from your household' share on your field? Yes =1, No=2

Code (A) Method of payments/ finance: Cash=1, payments from parts of harvest=2, credit=3, other payment in kind=4, part of traditional labor sharing =5, others=6 (specify)

	2.Amount of local seeds (k.g)		3. What was the share of local seeds did you used through purchase? {Use only if the hh purchased… [Name]…			4. Did you use improved seeds in the last kiremt? Yes=1, no=2, if yes fill the following.		5. What was the amount of improved seeds did you used through purchased? {Use only if the hh purchased... (Name) …			6. Did you use fertilizer for use on your fields? Yes=1, No=2, if yes fill the following.		7. What was the amount of fertilizer did you used trough purchase? (USE only if the hh purchased … (NAME)...			8. Did you use pest side & other chemicals ? Yes=1, No=2		9. What was the amount of pest-side and other chemicals did you used trough purchased? {Used only if the hh purchased… [NAME]…			10. Location (origin) of input. Kebele=1, woreda=2, market=3	11.Distance to the modern input center
	Amount(k.g)	value	Amount (k.g)	Cost	Code (A)	Amount (k.g)	value	Amount (k.g)	cost	Code (A)	Amount (k.g)	value	Amount (k.g)	Cost	Code(A)	total Amount (lit)	value	Amount(lit)	cost	Code(A)		
Local seeds																							
Improved seeds																							
Fertilizer																							
Pest-side & other chemicals																							

2. If your answer in Q4 is no, what are the main reasons that you are not using improved seeds? Inadequate supply=1, high price=2, late delivery=3, fear of risk=4, others (specify) _____

3. If your answer in Q6 is no, what are the main reasons that you are not using fertilizer in last production season? In availability of fertilizer=1, higher price=2, shortage of rainfall (bad weather) =3, absence of fertilizer credit=4, late delivery=5, others (specify) _____

4. Did you have any other expenses associated with the last kiremt crop production and the sale of crops, such as for plants, transport, tools etc ? if yes, what was the total value that you incurred?_____birr

Crop income from irrigation and belg harvest:

Crop code(A)	Harvest through irrigation =1, belg=2	Area of land cultivated in Tsimad.		How much was your harvest from last season's crop? [2004 EC]			Have you given any part of the harvest to others as payment for Kiray/rent and/or gift?			Have you sold any part of the last season's harvest?	if you sale any part of your harvest, answer questions on amount and revenue		
		Own land	Rented/sharecropped in	Quantity	Unit (B)	Value	Amount	Unit (B)	value	Yes=1, No=2	Amount	Unit (B)	Total revenue (Birr)

7. If you cultivated through rented –in, how much money /land rents did you paid in the last belg/irrigation season? _____Birr
8. Did you rented out your land in the last belg/ irrigation season? Yes=1, No=2, if yes, what amount of money you received? _____birr
9. Have you sharecropped out your land in the last main production season (kiremt)? Yes=1, No=2, if yes, how much income you get from sharecropped out?_____birr

Input use in belg and irrigation season

- The questions refer to all the land on which crops were harvested during the belg & irrigation season. The input questions refer to all crops as a whole.

Activity	Were any members of other households involved in the activity as part of a traditional labour sharing agreement?				If no labour sharing or apart from working with the work group, were any members of your Household involved in...[Name]...?		Did you hire in any labour & rented in oxen from outside the household to work on your land during the last belg & irrigation season?				How much did you spend on traditional labor sharing activity?
	Total Number of owen hh member labor days	Total number of owen oxen days	Total number of other hh members labor - days	Total number of oxen days from others hh.	Total number of labor days	Total number of oxen days	Total number of labor days	Total payment included in –kind payments	Total number of oxen days	Total payments Included in-kind payments	
Ploughing											
Weeding											
Harvesting											

1. Did you use any manure from your household' share on your field? Yes =1, No=2

	2. Amount of local seeds (k.g)		3. What was the share of local seeds did you used through purchase? {Use only if the hh purchased… [Name]…			4. Did you use improved seeds in the last kiremt? Yes=1, no=2, if yes fill the following.		5. What was the amount of improved seeds did you used through purchased? {Use only if the hh purchased... (Name)...			6.Did you use fertilizer for use on your fields? Yes=1, No=2, if yes fill the following.		7. What was the amount of fertilizer did you used trough purchase? (USE only if the hh purchased … (NAME)...			8. Did you used pest side & other chemicals? Yes=1, No=2		9. What was the amount of pest-side and other chemicals did you used trough purchased? {Used only if the hh purchased..[NAME] …			10. Location (origin) of input. Kebele =1, woreda =2, market =3	11.Distance to the modern input center
	Amount(k.g)	value	Amount (k.g)	Cost	Code (A)	Amount (k.g)	value	Amount (k.g)	cost	Code (A)	Amount (k.g)	value	Amount (k.g)	Cost	Code(A)	total Amount (lit)	value	Amount(lit)	cost	Code(A)		
Local seeds																							
Improved seeds																							
Fertilizer																							
Pest-side & other chemicals																							

2. If your answer in Q4 is no, what are the main reasons that you are not using improved seeds? Inadequate supply=1, high price=2, late delivery=3, fear of risk=4, others (specify) _____

3. If your answer in Q6 is no, what are the main reasons that you are not using fertilizer in last production season? In availability of fertilizer=1, higher price=2, shortage of rainfall (bad weather) =3, absence of fertilizer credit=4, late delivery=5, others (specify) _____

4. Did you have any other expenses associated with the last Belg/ irrigation crop production and the sale of crops, such as for plants, transport, tools etc? if yes, what was the total value that you incurred?_____birr

Part 5: Livestock ownerships and income from livestock products

1. Do you have Owen livestock at present? Yes =1, No =2, if no go to part 6.
2. If your answer is yes, indicate the number and types of livestocks that you owned? << Included any animals that belong to you, but are being reared by other households. Do not include any animal that you are rearing for someone else, but do not belong to you>>.

Types of livestock	Number owned at present	Total value	In last 6 month, did you buy any animals?			Did you sell any animals in the last 6 months?			During the last month, how many were died/lost
			Number Of bought	Total purchase	Source of finance (A)	Number sold	Total sales value	Reasons for sales **(A)**	
Oxen									
Local cows									
Improved cows									
Heifer									
Bull									
Calf									
Sheep(adult)									
Sheep(young)									
Goat(adult)									
Goat (young)									
Donkey(adult)									
Donkey(young)									
Mule									
Horse									
Camel(adult)									
Camel(young)									
Poultry									
Bee-									
Code(A) 1=to buy food, 2= to buy farm implement, 3= to pay credit, 4= to buy inputs, 5=to buy other livestock, 6= to buy house building materials, 7= to repay loan, 8=to pay for education expense, 9= for health expense						Code (B) 1=income from farm,2=income from sale of livestock, 3= income from asset selling, 4=from saving, 5=from loan, 6=other income, 7= others (specify)_____			

Livestock expenditure and income

1. During the last four months, have you had any of the following expenditures related to livestock?

expenditure on livestock during the last 6 months			**Income from sale of household's animal products in the last 6 months?**				
Type of expenditure	2) method of payment(A)	3) cash value (if in kind, give estimated cash value)	Type of products	Did you sale any... (..) ..? yes=1, No=2	Amount sold	Unit (B)	Total revenue
labour for herding			Meat				
Feed, including salt			Hides/cheese				
veterinary services/medicine			Milk/cream				
Transport of animals feed or supplies			Dung cakes				
Commission on the sale of animals			eggs				
Other expenses			honey				
Code (A) : 1= Cash, 2=Loan from provider, 3=Payment in kind, 4= By providing labour services to other household**,** 5= No payment, other (specify) **Code (B**): 1= Kubaya, 2=Kil/enkible, 3=jock, 4=kilogram, 5= Litters, 6=Jerikan (10 liter), Other (specify)_____							

Part 6 off-farm income & business activities

Section 6.1. Employment for wages

Code (A) 1=Farm Worker (for pay) 2=Traditional labour sharing (farm work) 3=Professional (teacher, government worker, administration, health worker, clerical) 4= Laborer (skilled i.e. builder, Thatcher, hair cutting or dressing), 5= Trader (trader for wage), 6= Soldier, 7= Driver/Mechanic 8= unskilled worker (daily laborer) 9= Domestic servant (yebet agelgay)	10= Food/cash for work (labor selling), 11=others (specify) ____ **Code (B) Qualification and training,** 1=Experience only, 2=Training only 3=qualification/education only, 4= Nothing **Code (C)** 1=Excesses of labor	2=Because my education is outside agriculture 3=Shortage of land 4=Lack of interest on farm 5=Because of high profitability 6=Insufficiency of farm work for living 7=Lack of sharecropped in land 8=Lack of additional rented in lands 9=Lack of Owen oxen 10=Other (specify)	**Code (D)** 1=General purchase for the household 2=Personal purchases from the person who runs the business, 3=Saved, 4=Payment for school, 5=For debt settlement 6=Expenditure for the children 7=Invested into the business 8=Purchase livestock/other asset 9=For payment of taxes and contribution 10=purchase of fertilizer , 11=Other

1. In the last 12 months, did any of the household members work off the household's land either on someone else's land or in some other employment or against payment in cash/kind? Yes =1, No =2 "If yes, give the following details". "If no go to section 6.2"

Hh member's ID	Type of work (A)	What she/he need? Code (B)	Is it permanent (=1) or temporary (=2) work?	Total days worked in each season			Total income earned in Birr			To what purpose the income used? Multiple codes are possible (D)
……..	……..	……..	…….	1st season Tir-maziya 2004	2nd season Ginbot-nihas 2004	3rd season Mesk-tahis 2005	1st season	2nd season	3rd season	……

1. Why did you choose to work also on the farm and/or only off the farm? _____*[codes for the reason to work in off the farm code C]*
2. Have you get information about the importance of off-farm income participation? Yes=1, no=2, if yes in which sources? 1=radio/TV, 2=meeting, 3=traing by extension agents, 4=friends through discussion, 5 others (specify)_____

Section 6.2 own business activities: I would like to ask you about your income earning activities such as craft, trades, or other business, carried out by any of the household members this year. If any of the household members are involved in such activities, fill the following: ‘’if no, go to section 7”

Table	1.Hh member ID	2. Total days worked by the HH			3. How much has the household earned net?			4 . Total hired labour used		5.To what purpose income used? Code(D)
Activities		1st season Tir-maziya 2004	2nd season Ginbot-nihas/04	3rd season Mesk-tahisas/2005	1st season	2nd season	3rd season	Total days worked	Paid wage in birr	
Weaving (shimena)										
Milling (metehan)										
Handicraft, including pottery										
Hair dressing (Kuno)										
Spinning (Fetli)										
Trade in grain/ general										
Trade in livestock										
Traditional healer/ Religious teacher										
Selling wood & charcoal										
Selling Tela,areqi, Tej, Enjera,dabo, kollo, etc.										
Woodworker										
Transport by pack Animal including selling salt										
Others (Specify)										

Part 7: Remittance and other transfers receipts

Code (A):	**Code (B):**	**Code (C):**
1= remittance from abroad (in cash & in kind) , 2= remittance from domestic (in cash & in kind) 3= pension, 4= food **aid** & non-food aid, 5= **gifts**, 7= inheritance 8=dowry(gifts at marriage) 9= others (specify)___	**1=**non-resident household members from abroad 2=non-resident household members from domestic 3=relative of household members from abroad 4= relatives of household members from domestic 5= friends from abroad , 6= friends from domestic 7= government organization, 8= non-government agency, 9=others (specify)____	1=to buy foods for the household 2=non-food purchase for the household 3=invested in business, 4=payment for debit 5= payment for education, 6= payments for health expense , 7=buying agricultural inputs, 8= buying agricultural implements, 9= buying household asset, 10= saved, others (specify)____

1. Has the household received any other income (such as remittance, gifts or other transfers) in the last 12 months? Yes = 1 (Give details) No=2, '' if no go to section 8''

Type of receipts (A)	Sources (B)	How many times did you receive in the last 12 months?	Amount received in the last 12 month: value in birr if there is in kind	What was this income mainly used for? (C)	How many years did your household received this transfer/aid/remittance so far?

1. How many numbers of migrants to abroad did you know in your neighborhood? _____
2. How many numbers of domestic migrants did you know in your neighborhood? _____
3. Did you/your household member given out remittances, gifts or other transfer to someone in the last 12 months? Use the estimated value if there is in kind._____birr

Part 8 farm implements and household durable assets

Agricultural equipment	quantity	Value at current mkt et price	Year obtained	Furniture and household durables	quantity	Value at current mkt price	Year obtained
Plowing Set (Mesarei)				Radio			
Mahresha				Tape-recorder			
Broad bed maker (oxen-pulled)				Television			
Hoe + Af kutu (Mekuati)				Motor vehicle			
Spade (badela)				Refrigerator			
Sickle modern (Meatsid)				Mobile phone			
Sickle traditional				Bed (wood+metal+tefir)			
Hammer +pick ax (Martello + Medosha)				Tire (metal + plastic)			
Dijino+zabiya+kareta				Landline phone			
Axe + Fas (misar)				Chairs + Tables+ Cupboard			
Saw (megaz)+Pruning Shears (Megrezia)				Barrel /Bermil (plastic+wood made)			
Small Tractor				Box+kumsatine+shalfe			
Arebia				Electric mitad			
Cart (Gari)				Gas medija+ safa (iron+plastic)			
Generator				Oven + Fanos/Masho			
Tridal Pump (Stina)				Gold +siliver + birr			
Drip irrigation (tebtebta)				Watch/Clock			
Hand-held motorized tiller				Sofa set			
Modern Beehive (Zemenawi Kefo)				Bicycle			
Knapsack Chemical Sprayer				Charcoal stove			
Mechanical Water Pump (hand, foot…)				Kerosene stove			
Motorized Water Pump (diesel)				Improved /fuel efficient stove			
Weaving equipments				Thermo flask			
Motorized grain mill (diesel)							

Part 9: access to different services:

Section 9.1: Access to extension services.

1. Did you or anyone in your household receive any extension service /advice from extension personnel/ DAs in last 12 months? Yes=1, No=2, ‘’if no, go to Q.No. 4,5’’
2. If yes, how many days did, the official of extension personnel visited you or your household members in the last year? _____days

3. What was the purpose of these visits (Multiple answer is possible)?

1= To get advice on fertilizer use,2= To get advice on irrigation, 3= To get advice on new seed verities, 4= To get advice on pest infestation, 5= To get advice on weather problem, 7= To get advice on marketing issue , 8= To get advice on credit services, 9= use of manure, 10= Weed control, others (specify)_____

4. On average, how long do you traveled on foot (in-single trip) to contact DAs/ reached to the extension service center? _____km_____hr/min.
5. If your answer in Q1 is no, what is the reason behind that? Absence of DAs in the area=1, lack of interest=2, too much distance from dev. t agents=3, 4= lack of lack of awareness,
   Others (specify) _____

Section 9.2: Access to credit

1. Have you ever taken any loan from ACSI? Yes=1 No=2, "if no, go to Q. No.8 & 9"
2. What types of loan have you taken from ACSI? _____
   1= Group loan only 2= Package (individual) loan only 3= both loans
3. How many times have you taken group loans from ACSI so far? _____times; 1st loan in Year _____ and Last loan in Year _____
4. How many times have you taken individual loans from ACSI so far?_____ times; 1st loan in year_____ and the last loan in year_____
5. State three main uses (in order of importance) for which you used ACSI group & individual loans respectively? **Code (a)** 1st____2nd. ____3rd. ____& 1st _____2nd _____3rd _____
6. How much credit did you take individually in so far? Total_____birr, the most recent _____birr
7. How do you rate your repayment performance for ACSI loans? 1= Loan repay on time
   2=Mostly on time but sometimes delays, 3= Mostly delays but sometimes on time, 4= Mostly delays, 5= could not repay), Others (Specify) _____
8. How far from your residence or how long do you travel in one-trip to reach ACSI credit center?_____km_____hr/min
9. Have you taken loans from other sources than ACSI over the last 12 months? Yes=1, No=2, if no go to section 9.3.
   If yes, give the details.

Code (A): **1=**money lender/arata, 2= friends 3=relatives, 4= non-relatives(neighbor), 5=commercial bank, 6= bureau of plan & finance , 7=credit associations(cooperatives) 8= private banks, 9=NGO 10= bureau of agriculture(hh extension package)	11= Eddir/ mahber 12=Equb others (specify)_____ **Code (B):** 1= to buy food 2= to buy inputs, 3=to pay taxes/rents, 4= to pay credit 5= to start a business 6=for social ceremony,	7= to built house 8= to buy consumption durables 9 = to pay for travel expenses 10=to pay for health expenses 12=to pay for educational expenses 13= to pay for wedding 14=to pay for funereal expenses	15= to buy farm and other implements 16=to buy livestock 17= to pay for heard laborers other (specify)_____ **code (C) 1**=business**,** 2=employer 3=Relatives, 4= friends 5=others (specify)____

Credit	Source (A)	Distance to credit center	Reason to borrowed(B)	Amount borrowed		Interest rate on loan		Amount paid back principle + interest		How many times do you take credit?
				If cash =amount in birr	Convert to birr if there is in-kind.	If in cash = amount in Birr	Convert to birr if there is in-kind	If in cash =amount in birr	Amount in birr if there is in-kind	
Cr-1										
Cr-2										
.cr-3										
.										
.										

Section 9.3 membership and financial aspects

5. Are you a member of Equb at present? Yes=1, '' No=2, if no, go to Q.NO. 4''

6. If you are a member of equb, how much do you contribute per month? Br._____

7. Are you a member of Eddir at present? Yes=1 No=2, ''if yes, go to Q.No.9''

8. If you are a member of Eddir, how much do you contribute per month? Br._____

9. Did you have any amount of financial savings in the last year? Yes=1, No=2 , ''if no, go to section 9.4''

If yes, give details in the following table

Saved in	Yes=1, No=2	amount	Interest rate/year	Interest earned
Home				
ACSI				
CBE				
Private banks				
Trustworthy friends or relatives				

Section 9.4: FFW and other program participation

1. Is there the food for work program (PSNP project) available in your area? Yes =1, no=2, ''if no go to Q.No.5''
2. Did your household participate in the Safety Net (PSNP) during the last year? Yes=1, No=2
3. If your answer in Q2 is yes, how many numbers of your household members are participating in this program? _____
4. For how many days did, your household participated in the Safety Net (PSNP) last year? _____
5. Did your household participate in the household Food security package during the last year? Yes=1, No=2, ''if no, go to section 9.5''
6. If your household participates in household Food security package, which package is it?

1. Modern beehive, 2. Dairy cow, 3. Sheep/Goat, 4. Chicken , 5. Oxen, 6. Vegetables, 7. Generator , 8. Other (Specify) _____

Section 9.5: Access to infrastructural and other basic services

1. How long do you travel to the nearest main market? via waking ____hr/_____min, via vehicle_____hr/_____min

2. What is your main source of drinking water? 1=covered, 2=ponds, 3= river water, others____

3. Distance from water sources_____hr/_____min_____km

4. How do you access the nearest town to the village?1=Via all weather road, 2= Via dry weather road

5. Distance to all weather roads from household residence _____hr/_____min

6. Do you have toile facility? Yes=1, No=2

7. Housing types: 1=Corrugated iron sheets, 2=Concrete and cement, 3=Thatch, 4=Wood and mud, 5=Wood, mud, thatch and stone, Other (Specify)_____
8. Distance from Source of Fire Wood_____hr/_____min_____km

Section 9.6 village level infrastructures

I would like to ask you about the following infrastructural services either they are available in your village or not.

Infrastructure and service	1) Dose these services physically available in your village/? Yes or NO	2)If yes, specify the number	3) If No, please indicate the distance of the nearest service/infrastructure from the center of your village? Please measure per hours			
			a.kms	*b. Walking*	*C.Vehicle*	*d. Pack Animal*
Primary school						
Junior/com. Secondary						
Health center (clinic)						
Livestock Market						
Nursery site						
Pharmacy						
Veterinary service center						
Public telephone						
Electricity						
Grain mill						
Paved/ all weather roads						
Rented truck						
Public transports						
Others (specify)						

Part 10: consumption expenditure

Section 10.1 food expenditure

1. Which of the months in a year are worst in terms of food availability(September, October, November, December, January, February, March, April ,May, June, July, August: underline the chosen months)
2. Which of the months in a year are good in terms of food availability(September, October, November, December, January, February, March, April ,May, June, July, August: underline the chosen months)
3. Which of the months in a year are average in terms of food availability(September, October, November, December, January, February, March, April ,May, June, July, August: underline the chosen months)
4. How many meals per day did your household eat per day where the availability of food is average **in a non-fasting season?** _____
5. We would like to ask you about all the food that was bought for consumption and/or was consumed from your own stock, in last month.

Please do not include food bought for resale, even after processing (aggregate from the different sources should be equal to the total amount consumed).

Code (A) unit of measurements: 1=K.g, 2=Litter, 3=Tassa, 4= kelikelo, 5= Janbo,6=Bottle, 7= Kubaya, 8= Birchiko, 9= kunna, 10= Medeb, 11= Akmada, 12= Kasha, 13= Jerican (20 litter), 14= Jock(4k.g), 15= Enkibile, 16= number, 17= Comma sahin, 18= Sini, 19= Enkib, 20= Quintal, 21= tikle/esir

	Food type	Total food consumption in the last 30 days			Consumed from purchased		Consumption from own harvest		Consumption from gifts or food aid		Consumed from other sources	
		Unit (A)	Amount	Value (birr)	Amount	Value (birr)	amount	Value (birr)	Amount	Value(birr)	Amount	Value (birr)
Cereals	Teff											
	Barley											
	Wheat											
	Maize											
	Sorghum											
	Finger Millet/oats											
	Finger Millet											
	Rice											
	Furno duket											
	Beso duket											
Pulses	Lentils(mesir)											
	horse Bean/bakel											
	Cow peas/ater											
	Chick peas(shira)											
	Guaya											
Oil crops	Linseed(teliba)											
	Boleke											
	Sesame/selit											
	Sun Flower (suf)											
	Nug											
	Groungnut/lewuz											
	gulo											
spices	Salt											
	Berbere											
	Cooking oil											
	Onion/key											
	Garlic/nech											
	Jingibil											

	Food type	Unit (A)	Total food consumption in the last 30 days		Consumed from purchased		Consumption from own harvest		Consumption from gifts or food aid		Consumed from other sources	
			Amount	Value (birr)	Amount (k.	Value (birr)	amount	Value (birr)	Amount	Value(birr)	Amount	Value (birr)
Spices	abish											
	Sugar											
Beverages	Tella											
	Arequi											
	Teji											
	Beer (Bira											
	Soft drink											
	Coffee											
	honey											
	tea											
	coffee											

	Food type	Unit (A)	Total food consumption in the last 7 days		Consumed from purchased		Consumption from own harvest		Consumption from gifts or food aid		Consumed from other sources	
			Amount	Value (birr)	Amount(	Value (birr)	amount	Value (birr)	Amount	Value (birr)	Amount	Value (birr)
Product	Macaroni											
	Pasta											
	Bread											
vegetables'	Potato											
	Tomatoes											
	Sweet potato											
	Carrot											
	Keysir											
	Kariya											
Gomen (selata, kosta, tikile gomen etc)												
	Others											
fruits	Orange											

			Total food consumption in the last 7 days		Consumed from purchased		Consumption from own harvest		Consumption from gifts or food aid		Consumed from other sources	
	Food type	Unit (A)	Amount	Value (birr)	Amount(	Value (birr)	amount	Value (birr)	Amount	Value (birr)	Amount	Value (birr)
	Papaya											
	Avocado											
	Zeytihun											
	banana											
	Sugar cane											
Milk &animal product(ask this question for non-fasting season)	Milk/yogurt											
	Cheese											
	Butter											
	Beef meat											
	Mutton/goat											
	Chicken											
	eggs											
	Others											

6. Is the household has purchased any prepared food, or eaten elsewhere against payment in the last months? Yes=1, No=2, if yes total expenditure in the last 30 days (in birr)_____

Section 10.2 Non-food expenditure

Would you tell me the household's non-food expenditure in the last 12 months?

Items		Total expenditure incurred (Birr)	Expenditure paid by other household (outside your family members (Birr)
Clothes and shoes	Clothes/shoes/fabric for adults (both men and women)		
	Clothes/shoes/fabric for children (both boys and girls) do not include a student's uniform		
	Linens; sheets, towel, blankets, others		
Cooking materials & lighting	Kitchen equipment; cooking pots, midija, others		
	Kerosene (including for lighting),		
	Fuel wood & charcoal from purchased		
	Fuel wood & charcoal from Owen		
	Matches		
	Batteries		

Items		Total expenditure incurred (Birr)	Expenditure paid by other household (outside your family members (Birr)
Household Durables	Furniture and lamp/ torch		
	Building material for houses		
	Others		
Cleaning and personal care items	Soap (both for close and body), omo (soap powder), others		
	Cosmetics; Hair Oil (both men &women),		
	Hair butter purchase		
	Hair butter from own product		
	Hair salon (for both women & men)		
	Others		
Educational expenses	Educational materials: books, pen, pencil, bags, uniform etch		
	School fees		
Medical expenses	Modern medical treatment and medicine		
	Traditional medical services and medicine		
	Others (Specify)		
Transportation expenses	Transportation expenses including both for man and goods, livestock etc.		
Social and other contributions	Contribution to EDIR, association (women, youth, farmers, sport etc.)		
	Contribution to ADA, ANDM, etc.		
	Contribution to church/ mosque		
	Contribution to community service construction (schooling, clinic, etc.)		
	Taxes and other contribution to tibia(police station, and other)		
	Compensation and penalty		
	Other voluntary contribution (not for credit)		
Service charge	Electricity		
	Water bill (other related)		
	Others (specify)		
Ceremonial expenses ** &***	Wedding, Teskar, kurban, kiristna, senbete, mahiber-tsebel, engagement (kelebet-assera), etc		
Cigarettes & chat	Cigarettes & chat		

**** 1. Prepared by interviewee,: Wedding_____** _____; Funeral ceremonies (incl. Teskar, kurban) _____; Engagement (kelebet elsewhere) _____; Circumcision (religious holy days) _____;
Mahber _____; Senbete_____

****2. Paid to others: estimated value for all_____**

Part 11: Shocks and coping mechanism

Section 8.1 short-run shocks

Code (a), What did these shocks result in	**Code (B), How widespread was shock.**
1. Loss of productive assets 2. Loss of household income 3. Reduction in household consumption 4. Asset & income loss 5. Asset loss & reduced consumption 6. Income loss & reduced consumption 7. Asset, income loss & reduced consumption 8. Other effects not listed here.	1. Only affected my household 2. Affected some households in this village 3. Affected all households in this village 4. Affected this village and other villages nearby 5. Affected areas beyond this kebele.

1. Has this household been affected by the following shocks in the last year?

types of shock	CODE	1=YES 2= NO	Did these shocks result in: **Code (A)**			How many days the individual in illness/injure?	How many days that illness/injured person absent from main activities?	How widespread was this shock? **Code (B)**		
Drought	101									
Too much rain or flood	102									
Erosion	103									
Frosts or hailstorm	104									
Pests or diseases that affected crops before they were harvested	105									
Pests or diseases that led to storage losses	106									
Pests or diseases that affected livestock	107									
Death of husband	501									
Death of wife	502									
Death of another person	503									
Illness of husband	504									
Illness of wife	505									
Illness of another person	506									
Others (specify)										

1. How many numbers of your livestock loss occurred in last year due to (drought, flood, livestock disease, etc) _____value in birr_____

Section 8.2 long run shocks

1. Has this household been affected by a serious shock in the last 5 years? What are the worst shocks in these years?

types of shock	CODE	1=YES 2= NO	Did these shocks result in: **Code (A)**			How many days the individual in illness/injure?	How many days that illness/injured person absent from main activities?	How widespread was this shock? **Code (B)**		
Drought	101									
Too much rain or flood	102									
Erosion	103									
Frosts or hailstorm	104									
Pests or diseases that affected crops before they were harvested	105									
Pests or diseases that led to storage losses	106									
Pests or diseases that affected livestock	107									
Death of husband	501									
Death of wife	502									
Death of another person	503									
Illness of husband	504									
Illness of wife	505									
Illness of another person	506									
Others (specify)										

2. How many numbers of your livestock loss occurred in last 5 years due to (drought, flood, livestock disease, etc) _____value in birr_____

3. What were the three most important shocks to affect this household?

	1. Most important shock		2.Second most important shock		3.Third most important shock	
	Shock (use numerical codes above)	Year (E.C.)	Shock (use numerical codes above)	Year (E.C.)	Shock (use numerical codes above)	Year (E.C.)
Thinking about the last 5 years, what were the three most important shocks to affect this household						
How did your household cope with these major shocks/hardships? ***Code (C) below***						

Code (C):

Self-insure

1. Use own funds, savings
3. Sow another crop later
4. Sell livestock
5. Sell other assets
6. Rent out land
7. Eat less preferred food
8. Consume seed stock
9. Eat less
10. Spend less on clothing
11. Spend less on medicine
12. Spend less on school
13. Defer expenses
14. Get additional job
15. Send children to work
16. Migrate

Community-based

21. Share livestock
22. Sharecrop
23. Donations from relatives, friends and private persons
24. Donations from community organizations
25. Loans with interest from relative, friends, private persons
26. Loans with interest from community organizations
27. Loans without interest from relatives, friends, private persons
28. Loans without interest from community organizations

External

31. Work for PSNP
32. Emergency food aid
33. Assistance from farmer's cooperative
34. Assistance from government
35. Assistance from NGOs
36. Loans from banks
37. Other – please describe: _____

Thank you!